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NAVY CIVIL ENGINEER

SUMMER EDITION 1972

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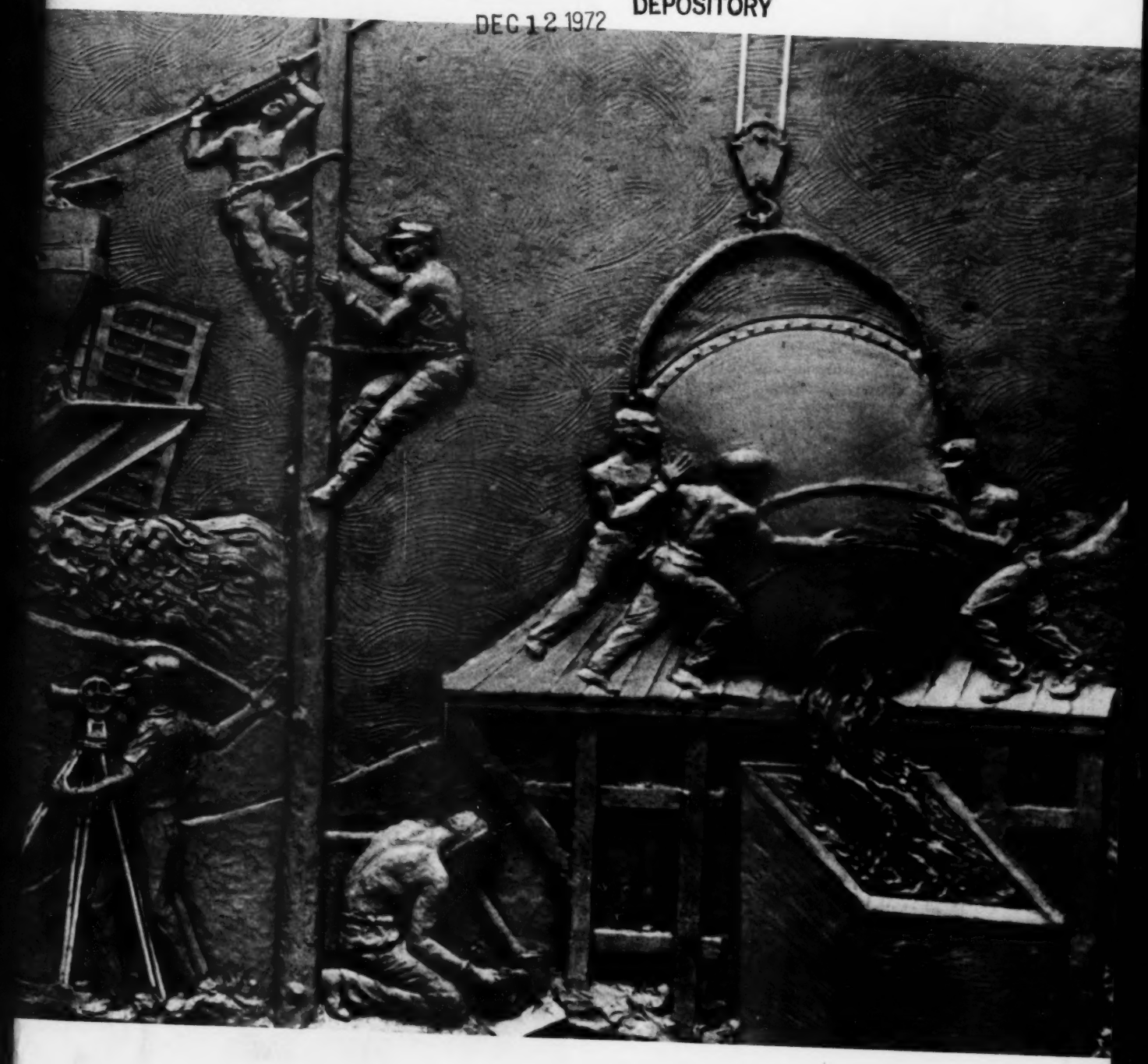

SEABEE MEMORIAL

PAGE 16

— ON THE COVER —

The bas-relief of the National Seabee Memorial (*See pages 16-17*) portraying Seabee construction skills may also well illustrate The End of A Construction Decade in Vietnam (*See pages 8-22*), a series of articles concerning the successful conclusion of the massive construction effort administered by the Naval Facilities Engineering Command.

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SPEAKING FROM TOPSIDE

We are making some changes in our CEC flag assignments, in Vietnam, and in our Atlantic Division. Here is a quick rundown.

Rear Admiral James V. Bartlett, having completed thirty years of active duty, is scheduled to transfer to the retired list of the Navy, as of 1 October.

Rear Admiral A. R. (Mike) Marschall is to be the new Vice Commander of the Naval Facilities Engineering Command and the Deputy Chief of Civil Engineers.

Rear Admiral Donald G. Iselin has reported as Commander of the Pacific Division and Commander, Naval Construction Battalions, U.S. Pacific Fleet.

Rear Admiral Foster M. Lalor, Jr. has reported to the Office of the Deputy Chief of Naval Operations (Logistics) for duty as Director of the Shore Installations Division, Code NOP-44.

Rear Admiral John R. Fisher has reported to NavFac HQ for duty as Deputy Commander for Planning, Code 09P.

The OICC Republic of Vietnam is to be disestablished as of 1 October, and the Pacific Division of the Naval Facilities Engineering Command will assume OICC responsibilities for the NBy 44105 construction contract. All other construction in Vietnam will be administered through a Director of Construction, located in Saigon, reporting to the OICC at Bangkok, Thailand.

In order to provide optimum facilities engineering assistance to activities in the European Area, the Atlantic Division has established a European Branch Office which is located adjacent to the Naval Support Activity in Naples.

W M Enger

W. M. Enger
Rear Admiral, CEC, USN
Commander
Naval Facilities Engineering Command

Midshipmen leaving Michelson Hall

Modernization at the U. S. Naval Academy

• Washington, D. C.

During the past several years, the United States Naval Academy at Annapolis, Maryland has been in the midst of major construction activities designed to provide the 4000 plus midshipmen with modernized and expanded academic facilities that will enable the academy to keep abreast of changing technology and new developments in education in response to the needs of the fleet.

The basic physical facilities of the naval academy were constructed around the turn of the century in accordance with a plan prepared by architect Ernest Flagg. The enrollment at that time was approximately 300 midshipmen, and the curriculum was oriented primarily to the practical skills of navigation, gunnery and seamanship. Today, there are more than 4000 midshipmen and the present training program reflects the drastic changes in our technology since World War II, especially in the past 10 years.

After World War II several studies were undertaken to determine future plans for the academy. In 1961 the Moreell Commission, headed by Admiral Ben Moreell, former chief of the Bureau of Yards and Docks, reported the need for expansion and modernization of academic facilities. On the basis of that report, it became apparent that more detailed studies of space requirements and building locations would be required.

The results of these more detailed studies are reflected in the 1965 and 1967 master plans prepared under the direction of the Chesapeake Division, Naval Facilities Engineering Command, by John Carl Warnecke and Associates, architects and planners.

One constraint recommended in these planning studies was that all academic space must be located within a seven minute walking radius from the center of Bancroft Hall. This restriction was critical because campus land is in short supply with expansion limited by the Severn River, Dorsey Creek and dense development in the city of Annapolis.

To provide the land needs, the navy was faced with the alternatives of land fill, acquisition of privately owned city land or relocation of existing non-academic facilities presently in the seven minute radius to more distant sites. After considerable study, it was decided that a small but adequate area could be provided within the seven minute radius to accommodate a science building, an engineering studies complex, a library, and an auditorium by relocating existing non-academic facilities and providing a land fill in the Dorsey Creek area. Acquisition of privately owned city land was rejected as a costlier and less satisfactory solution.

Twin-Tower Science Building

The most pressing need was for space for the science department. To fill this need, a new modern science building known as Michelson and Chauvenet Halls, was sited in the area at the open end, or Severn River side, of the campus square, opposite the chapel and adjacent to Bancroft Hall. The building is of contemporary design, having a military orderliness accented by a fortress type base and mansard roof and, using rich natural colors, harmonizes with its historic neighbors, yet is completely modern.

Michelson-Chauvenet Hall is a 300,000 square foot reinforced concrete frame granite veneer building on concrete, steel-encased piles. The lower level of the building houses modern electrical, electronics, physics and chemistry laboratories large enough to give each student adequate space for conducting advanced experiments in these subjects.

Above the laboratory level, the building is divided into two 3-story wings, giving the appearance of two identical structures; thus the two names, Michelson and Chauvenet Halls. Each wing houses classrooms, conference rooms, a technical reference library and faculty and administrative spaces. The mechanical equipment is located on top of the two wings and is shielded from view by the high mansard roof.

The location of Michelson and Chauvenet Halls on the campus square changes the formerly open square to a closed court. The handsome plaza space between the two wings is on the axis of the court and chapel and preserves the important vistas to the Severn River.

Michelson and Chauvent Halls offer new science study facilities

By J. L. WHITE, P.E.
Director, Design Div., NAVFAC

The science building complex was constructed in two stages. First, Baltimore contractors completed the foundations and portions of the laboratory floor, utility tunnels and walls. The second contract, which included the remainder of the laboratory construction, the plaza deck, and the two wings, was constructed by the George Hyman Construction Company. The construction cost of this building, completed in 1969, including both contracts and the relocation of athletic facilities from the building site, was approximately $13,500,000.

Site Clearance

The next critical items of construction at the academy were the library and engineering buildings. Before construction could begin on these structures, however, the sites had to be cleared and prepared. In order to start clearing, the new central heating plant, laundry and dry cleaning plant, printing and publication facilities, and emergency power facilities had to be completed. Completion of these projects would allow demolition of the old power plant, laundry, and printing and publication buildings. In addition, utilities had to be relocated.

An example of the complexities involved in scheduling this large construction undertaking could be the requirement for completion of the emergency power facilities and the new central heating plant at the same time. This would allow the old power plant to be shut down and demolished immediately.

While site clearing was under design, the land fill project along the south shore of Dorsey Creek ran into trouble when borings in the creek revealed several deep pockets of soft organic clay under the proposed landfill and bulkhead area. In places, these pockets of clay were fifty to sixty feet thick. Laboratory tests indicated the materials to be very weak, with poor cohesive qualities, highly compressible and slow draining. Settling of up to 20% of the initial clay layer thickness was anticipated, varying from a few inches to approximately ten feet. To provide the originally planned land fill area under these subsurface conditions would require a very expensive sheet pile bulkhead of cellular construction and considerable hydraulic dredging.

Alternative Fill Method

Faced with this problem, navy engineers and representatives of Praeger-Kavanagh and Waterbury, consulting engineers, developed an alternate method consisting of reducing the area of land fill by taking advantage of a more efficient siting arrangement, and by using a lightweight fill with flat slopes (10:1) requiring no bulkhead, in lieu of a steel sheet piling bulkhead. The lightweight fill selected was oyster shells. An oyster shell dike was constructed with the interior or shore side of the dike being filled with select fill material. By employing this procedure the fill would be inexpensive, could be brought in by barge, washed into place, and cause little or no pollution. The oyster shell fill would also consolidate uniformly and absorb forces satisfactorily.

The placing of the fill was planned in three stages, with a consolidation period of several months between each stage. Sand drains were placed at intervals in the fill to assist in the acceleration of consolidation. The fill is now in place and most of the consolidation process is complete.

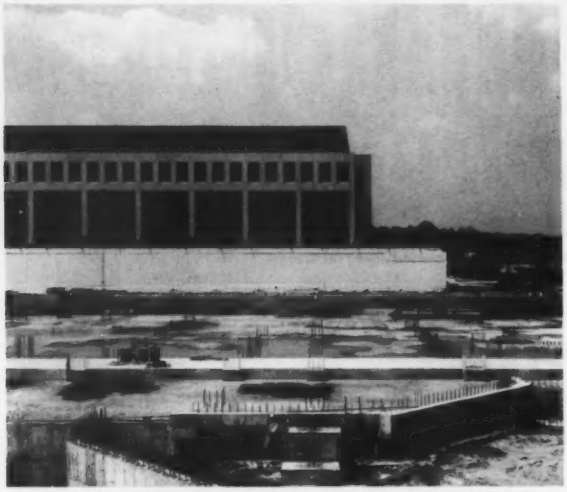
Library Design and Construction

While the site was being cleared and prepared, design of the library and engineering studies complex was underway. The navy, through the Chesapeake Division, selected a joint venture of John Carl Warnecke and Associates and George M. Ewing Company to design and prepare construction drawings for these two buildings.

The first of the two projects under construction was the 225,000 square foot library building, located on the edge of the south shore of Dorsey Creek just west of the old power plant site. It was designed for an ultimate capacity of 750,000 volumes, with seating for approximately 1600 midshipmen. The building is of contemporary design, reinforced concrete

New Sites At

Site preparation at Dewey Field prior to removal of laundry and steam plant.



The new Nimitz Library nears completion as massive emplacements for the Engineering Studies Complex are constructed.

Historic Maury Hall (left) adjoins the Nimitz Library (right) with first stage of Engineering Studies Complex underway in foreground

frame, granite veneer, and concrete steel-encased pile foundations. The lower floor will house classrooms, a bookstore, educational TV studio, library map and chart room, and administrative spaces.

The second, third, and fourth floors will house book stacks, general reading rooms, current periodicals, reference rooms, public documents, Annapolis room, archives and rare books, group study rooms, and administrative and faculty spaces. The library building carries out the theme of contemporary design to blend in with and complement the older French Renaissance buildings of architect Ernest Flagg's era.

Actually, the library, engineering, and science buildings are interrelated. In effect, they are one large building complex joined by a series of plaza levels and passageways.

The construction contractor for the library is J. W. Bateson Company, Inc. The construction cost is approximately $9,500,000. The schedule calls for construction to be completed near the end of calendar year 1972.

Engineering Studies Complex

The engineering studies building is by far the most complex of all the new construction. It is being constructed on the site of the old power plant and laundry buildings. Sub-surface conditions are poor and varied. Vibration tolerances for most of the laboratories and the large tow tank areas are extremely critical and rigid. The building will be of concrete frame structure, granite veneer, on long steel H-pile foundations. The piles vary in length from 50 to 180 feet.

The engineering building and laboratory complex will have a large laboratory on the first level with a modern tow tank over 380 feet long, with sophisticated wave making machinery, a dry dock, and a high speed, high acceleration tow tank carriage. The tow tank will be used to study design of ships under simulated sea conditions.

There will be laboratories with jet engine test stands and a completely assembled and operating helicopter engine, with rotor blades, for aerodynamics and aeronautical engineering studies. In addition, there will be a completely assembled, reduced scale, marine propulsion system for the study of marine engineering.

Other laboratories will have facilities for the study of nucleonics, heat transfer, thermo-fluids, mechanics and materials, aerospace hydromechanics, naval engineering and hydrospace and other fields of engineering pertinent to the support of the fleet. The laboratory will have a double floor, designed to allow complete flexibility and access to the many utility services available. It will be possible to provide a complete variety of utility services to any part of each laboratory.

In housing these complex and sophisticated laboratories, many problems were faced during design in the fields of hydraulics, structure, radio frequency and radioactive shielding, ventilation, air conditioning and acoustics. The problem of exhausting fumes and excessive volumes of air, and dampening excessive noise from the rotor lab and the jet engine test stands had to be solved.

Annapolis

The second, third and fourth levels of the engineering studies complex will house classrooms, lecture halls, conference rooms, administrative spaces and faculty staff offices. A large plaza deck, landscaped with suitable shrubbery and small trees, will be constructed over approximately one-half of the total laboratory and tow tank level of the complex. This plaza deck will be set with a transitional level that will link the plaza deck of Michelson-Chauvenet Halls with the laboratory plaza.

Phased Construction

The engineering studies complex is being funded by Congress in three fiscal year phases. Construction, therefore, will follow each funding phase. The first construction phase was funded in the fiscal year 1971 Military Construction Bill. A construction contract for this phase was awarded to Norair Engineering Corporation for the low bid cost of $8,649,840 in February 1971. The Norair contract included demolition of the old power plant, laundry and other old buildings. It includes construction of the extensive pile foundations, the lower level of the laboratory false floor, utility tunnels, the tow tank basin, some of the walls and water-proofing.

The second and third increments have been advertised for construction bids in the format of a single construction package. The low bidder on this construction package will be awarded the contract on the basis of a percentage of his low bid. This percentage is estimated and identified in the construction package to coincide with construction funds appropriated by Congress in the fiscal year 1972 military construction bill. Award of the remaining percentage of the low bid will be held as an option to be exercised on or before January 31, 1973, when Congress appropriates the funding for the third increment in the fiscal year 1973 military construction bill. It is expected that construction on the engineering studies complex will be completed prior to November 1974.

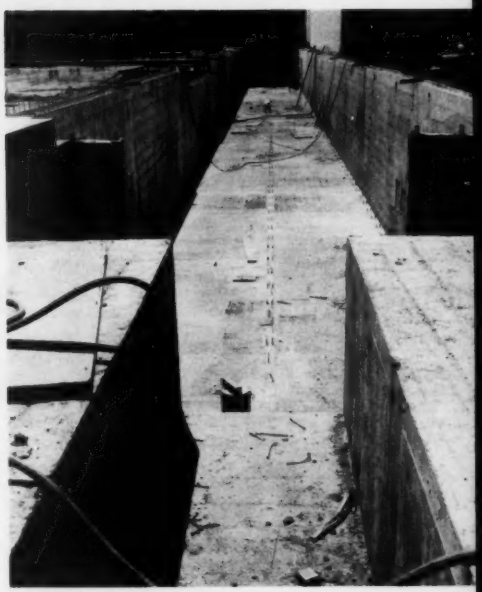
Rehabilitation and Modernization

When construction of the engineering studies complex building has been completed, the major portion of the construction expansion program at the United States Naval Academy will have been completed.

While construction for the new buildings has been taking place, the Navy has been modernizing the older academic buildings. The work on Sampson Hall, an older building, is now complete. This building has been completely rehabilitated and modernized. Design for the rehabilitation and modernization of Maury and Luce Halls has just begun. The modernization of other buildings will follow Maury and Luce Halls in the planning cycle.

The auditorium building, as proposed by the master plan, is being restudied. Included in the new studies for this function will be seating capacity and the economics of a new building versus alterations and additions to Mahan Hall.

The buildings being constructed are both functional and esthetically handsome, reflecting the character and goals of the United States Naval Academy. When the project has been completed it will add to the pleasant dignity of the academy and the historical city of Annapolis.



Unique requirements of the Engineering Studies Complex demand massive underground emplacements (top and right) adjacent to Maury Hall. Another campus view of Michelson-Chauvenet Halls (below) which house the Academy's division of mathematics and science.

RAdm. Walter M. Enger presents a NAVFAC plaque to Vietnamese Prime Minister Tran Thien Khiem following the contract closeout ceremony.

RMK-BRJ PROJECT LOCATION MAP

J Close Out in South Vietnam

In the decade ending in June 1972, the joint venture had built harbors, airfields, hospitals, roads, bridges and barracks worth $1.9 billion throughout South Vietnam.... These pages tell how it started, some of the accomplishments and, most important, the efforts to leave the Vietnamese with a strong, knowledgeable construction industry.

• Saigon, Vietnam

The largest military construction effort in modern history ended July 3, 1972 with a closeout ceremony marking the termination of a $1.9 billion, 10-year building program in Vietnam. Under the direction of the Officer in Charge of Construction (OICC) Vietnam, representing the U.S. Naval Facilities Engineering Command, the joint venture consortium RMK-BRJ constructed airfields, harbors, hospitals, cantonments, roads, bridges, utilities, supply depots, ammunition dumps, and communications and other special facilities.

Dignitaries at the closeout to mark the decade of construction included: Vietnamese Prime Minister Tran Thien Khiem; U.S. Ambassador Ellsworth Bunker; U.S. Army Vietnam Deputy Commanding General, LGen William J. McCaffrey; U.S. Naval Facilities Engineering Command, RADm. Walter M. Enger; and John B. Kirkpatrick, former RMK-BRJ general manager, representing the joint-venture firms.

Beginning in January, 1962, the contract was being performed by two companies: Raymond International Inc., Houston, Tex., the sponsor, and Morrison-Knudsen International Co., Inc., Boise, Idaho, as partner (RMK). In August 1965, it became necessary to expand participation to handle the greatly expanding workload generated by the buildup of American forces. At this time, Morrison-Knudsen became the sponsor and the firms of Brown and Root, Inc., Houston, Tex. and J. A. Jones Construction Co., Charlotte, N.C. entered as partners in the joint venture RMK-BRJ.

Construction Responsibility to NAVFAC

From 1956, the OICC Southeast Asia directed military construction throughout the area from its headquarters in Bangkok, Thailand. In July 1965, however, an independent OICC Vietnam was established in Saigon to administer contracts for the vastly-expanded construction program in Vietnam.

In 1962 the U.S. Department of Defense assigned all military construction responsibilities in Southeast Asia to the Naval Facilities Engineering Command (then the U.S. Navy Bureau of Yards and Docks).

Following interviews of prospective construction firms by a Navy Contractor Selection Board, the joint venture of Raymond International and Morrison-Knudsen (RMK) was selected for the project. Contract NBy 44105 for military construction in Vietnam was awarded to RMK by the Bureau of Yards and Docks and became effective 19 January 1962.

Small Scale Beginning

The contract began as a comparatively small $15 million effort. This early military construction consisted of improved airfields to bolster Vietnamese defenses at Tan Son Nhut, Bien Hoa and Pleiku, and a radar site at Da Nang. No one then envisioned the massive U.S. troop buildup yet to come or the burgeoning construction effort that would be mounted to support them.

Through mid-1965 the RMK work force in Vietnam remained well below 5,000 employees. The initial $15 million worth of work was expanded to a total $49 million military construction program through 1964. Prospects for a more vigorous construction program seemed unlikely in late 1964, so the OICC SEA initiated a closeout study when RMK's work was nearly complete!

Then everything changed drastically in 1965. President Johnson decided to

Principal participants at closeout ceremony included (left to right): J. B. Kirkpatrick, representing the joint venture; RAdm. A. W. Price, USN COMNAVFORV; Mr. Phan Quang Dan, Vietnamese Secretary of State; LtGen. W. J. McCaffrey, USA, Deputy, USARV; Prime Minister Tran Thien Khiem, Ambassador Ellsworth Bunker; Mr. Duong Kich Nhuong, Minister of Public Works; RAdm. W. M. Enger, CEC, USN COMNAVFACENGCOM; and Capt. R. F. Jortberg, CEC, USN, OICC, RVN.

RMK-BRJ

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Cam Ranh Bay was the site of one of the most complete military bases in Southeast Asia. RMK-BRJ built the bridge (upper left), constructed two 10,000-foot jet air strips, hangars, barracks, POL storage tanks, ammunition bunkers, roads, marine repair facilities and docks.

This 2,631 ft. bridge at Bien Hoa spans the Dong Nai Ri River for Highway QL-1, 17 miles northeast of Saigon.

MACV Headquarters were completed at Tan Son Nhut Air Base near Saigon in 1967.

Newport, the deep water harbor at Saigon, was a $50 million facility that relieved critical port congestion for the Army in 1967.

commit U.S. combat troops to assist the troubled Republic. American officials visited Vietnam and devised an all-out construction program to support these troops. The Secretary of Defense estimated that around $1 billion worth of facilities would be needed in Vietnam. Facilities requirements leaped ahead dramatically; the value of the work which had been constructed in three years would now be required as a monthly goal! Facilities for combat troops had to be built as quickly and as economically as possible.

Manifold Requirements Evident

Vietnam almost totally lacked facilities to support U.S. troops. Saigon was the only deep draft seaport; there were seven airfields, with Tan Son Nhut, Bien Hoa, and Da Nang offering only limited capability. No facilities existed to support a massive airlift delivery system of men and material. There were no cantonments to house and feed the troops. Electric power was available only in limited quantities. Even drinking water had to be purified!

The construction challenge eventually extended well beyond the direct support requirements and developed into a double-purpose program: construction of facilities for war which could also serve in peace.

In the 10-year period (1962-1972) RMK-BRJ built 15 jet-capable airfields, eight of which became major bases; 100 C-130-capable airfields; seven deep-draft ports with 20 deep-draft berths; hundreds of sub-ports and thousands of feet of small craft wharfs; storage tanks and tank farms for more than 3 million barrels of POL; cantonment for over 350,000 men; new hospitals with over 8,000 bed capacity; 56 million square feet of covered and open storage areas; 2.5 million cubic feet of cold storage areas; over 1,000 kilometers of improved streets, roads and highways; 8,300 lineal meters of new bridges and over 50 miles of railroad lines.

RMK-BRJ Resources

A total work force of over 200,000 people were employed in the past decade. Some Vietnamese workers were hired two, three or four times, since they preferred to stay near home and not move with the work, as is common in the United States. At all times 80% of the employees were Vietnamese.

The civilian contractor, used for the first time on such a scale in a combat zone, accounted for more than 60% of the construction in Vietnam. The Navy Seabees, Army engineers, Marines

(continued on page 12)

"...RMK-BRJ has written a new, outstanding record in the history of major construction"

NAVFAC's commander, RAdm. Walter M. Enger was one of the speakers at the RMK-BRJ contract closeout ceremony, at Saigon July 3, 1972.

In his address, he said:

"Mister Prime Minister, Ambassador Bunker, General McCaffrey, Admiral Price, ladies and gentlemen:

"I am proud to be here at this ceremony.

"In late 1962, the Bureau of Yards and Docks of the United States Navy, as the Department of Defense Construction Agent in Southeast Asia, searched for a construction contractor to prosecute a modest building program in Vietnam.

"The joint venture of Raymond International and Morrison-Knudsen was selected and began a $15 million program in January 1962.

"Since that beginning much has happened here.

"That small program has grown and become the largest concentrated construction effort in the history of the world.

"The joint venture grew to include the well-known construction companies, Brown and Root and J. A. Jones. The Officer in Charge of Construction, Vietnam and contractor team underwent rapid expansion during 1966 and 1967 to provide innumerable facilities urgently needed to support the military forces operating in Vietnam.

"Critical requirements existed for ports, air bases, ammunition depots, roads, bridges and communications systems.

"Construction equipment and building materials had to be ordered in unprecedented volume, even before designs of facilities were available. The requirements were so urgent that most of these facilities had to be built at the same time.

"The contractor's work force reached a 51,000 peak in July 1966.

"As the United States armed forces have helped strengthen the Vietnamese armed forces, RMK-BRJ has constructed facilities to contribute to their growth; and as the Vietnamization process is nearly complete, so is the construction program.

"The need for the capability which RMK-BRJ provided no longer exists and this ceremony marks the completion of their work.

"More than $1.9 billion of construction has been accomplished in these past 10 years. RMK-BRJ has written a new outstanding record in the history of major construction. I congratulate them for this superb achievement.

"This program also became the greatest challenge of the Navy's Civil Engineer Corps in its 130 year history. As Commander, Naval Facilities Engineering Command, I represent my predecessors who accepted this challenge and the Navy Civil Engineer Corps Officers who directed the work. A survey of our corps today shows few navy civil engineers who have not been involved in this Vietnam construction. It was these officers and the many other people who participated who made the program a success.

"I would like to acknowledge the outstanding contribution of the contractor top managers who made the joint venture work. They were able to bring together the kind of people who met challenges and solved them realistically. All of them cannot be with us today. I personally deeply regret that the one person who did most in the contractor organization, Bert Perkins, is not with us. His tragic death is mourned by us all.

"Key members of the contractor team came from many nations — 35 in all — with the Republics of Korea and the Philippines providing significant numbers of skilled engineers and tradesmen.

"The most significant contribution has been made, however, by the Vietnamese people. Their spirit, wholehearted cooperation and support have been the backbone of our success. This support came from all levels of the Vietnamese government and armed forces. The military assistance provided the contractor when operating at many remote and insecure construction sites was most important.

"The greatest contribution, however, was made by the 150,000 Vietnamese men and women who worked for the OICC and RMK-BRJ.

"These workers provided the muscle to build the harbors, the air bases, the supply depots, the roads and the bridges. They learned new skills and applied that knowledge effectively to operate modern, high-production construction equipment.

"They became highly effective mechanics and learned the range of construction specialties and worked long hours under extremely difficult circumstances to meet virtually impossible deadlines. The Vietnamese workers demonstrated a deep determination to get this job done.

"I am particularly pleased, as we proceed with the final phases of closing out the contract, to know that their efforts have also contributed to the growth of a stronger Vietnamese construction industry.

"The completion of this contract is not the end of our construction work in the Republic of Vietnam. The OICC has already awarded a large number of fixed price contracts to the Vietnamese construction industry. There will be more in the future.

"I look forward to a continuing successful relationship between the Naval Facilities Engineering Command and the Republic of Vietnam, its armed forces, the construction industry, and particularly the people of Vietnam."

Prime Minister Tran Thien Khiem presents the Vietnamese Order of Merit Medal to RAdm. Enger during the closeout ceremony.

Cam Ranh Bay was the site of one of the most complete military bases in Southeast Asia. RMK-BRJ built the bridge (upper left), constructed two 10,000-foot jet air strips, hangars, barracks, POL storage tanks, ammunition bunkers, roads, marine repair facilities and docks.

This 2,631 ft. bridge at Bien Hoa spans the Dong Nai Ri River for Highway QL-1, 17 miles northeast of Saigon.

MACV Headquarters were completed at Tan Son Nhut Air Base near Saigon in 1967.

Newport, the deep water harbor at Saigon, was a $50 million facility that relieved critical port congestion for the Army in 1967.

commit U.S. combat troops to assist the troubled Republic. American officials visited Vietnam and devised an all-out construction program to support these troops. The Secretary of Defense estimated that around $1 billion worth of facilities would be needed in Vietnam. Facilities requirements leaped ahead dramatically; the value of the work which had been constructed in three years would now be required as a monthly goal! Facilities for combat troops had to be built as quickly and as economically as possible.

Manifold Requirements Evident

Vietnam almost totally lacked facilities to support U.S. troops. Saigon was the only deep draft seaport; there were seven airfields, with Tan Son Nhut, Bien Hoa, and Da Nang offering only limited capability. No facilities existed to support a massive airlift delivery system of men and material. There were no cantonments to house and feed the troops. Electric power was available only in limited quantities. Even drinking water had to be purified!

The construction challenge eventually extended well beyond the direct support requirements and developed into a double-purpose program: construction of facilities for war which could also serve in peace.

In the 10-year period (1962-1972) RMK-BRJ built 15 jet-capable airfields, eight of which became major bases; 100 C-130-capable airfields; seven deep-draft ports with 20 deep-draft berths; hundreds of sub-ports and thousands of feet of small craft wharfs; storage tanks and tank farms for more than 3 million barrels of POL; cantonment for over 350,000 men; new hospitals with over 8,000 bed capacity; 56 million square feet of covered and open storage areas; 2.5 million cubic feet of cold storage areas; over 1,000 kilometers of improved streets, roads and highways; 8,300 lineal meters of new bridges and over 50 miles of railroad lines.

RMK-BRJ Resources

A total work force of over 200,000 people were employed in the past decade. Some Vietnamese workers were hired two, three or four times, since they preferred to stay near home and not move with the work, as is common in the United States. At all times 80% of the employees were Vietnamese.

The civilian contractor, used for the first time on such a scale in a combat zone, accounted for more than 60% of the construction in Vietnam. The Navy Seabees, Army engineers, Marines

(continued on page 12)

"...RMK-BRJ has written a new, outstanding record in the history of major construction"

NAVFAC's commander, RAdm. Walter M. Enger was one of the speakers at the RMK-BRJ contract closeout ceremony, at Saigon July 3, 1972.

In his address, he said:

"Mister Prime Minister, Ambassador Bunker, General McCaffrey, Admiral Price, ladies and gentlemen:

"I am proud to be here at this ceremony.

"In late 1962, the Bureau of Yards and Docks of the United States Navy, as the Department of Defense Construction Agent in Southeast Asia, searched for a construction contractor to prosecute a modest building program in Vietnam.

"The joint venture of Raymond International and Morrison-Knudsen was selected and began a $15 million program in January 1962.

"Since that beginning much has happened here.

"That small program has grown and become the largest concentrated construction effort in the history of the world.

"The joint venture grew to include the well-known construction companies, Brown and Root and J. A. Jones. The Officer in Charge of Construction, Vietnam and contractor team underwent rapid expansion during 1966 and 1967 to provide innumerable facilities urgently needed to support the military forces operating in Vietnam.

"Critical requirements existed for ports, air bases, ammunition depots, roads, bridges and communications systems.

"Construction equipment and building materials had to be ordered in unprecedented volume, even before designs of facilities were available. The requirements were so urgent that most of these facilities had to be built at the same time.

"The contractor's work force reached a 51,000 peak in July 1966.

"As the United States armed forces have helped strengthen the Vietnamese armed forces, RMK-BRJ has constructed facilities to contribute to their growth; and as the Vietnamization process is nearly complete, so is the construction program.

"The need for the capability which RMK-BRJ provided no longer exists and this ceremony marks the completion of their work.

"More than $1.9 billion of construction has been accomplished in these past 10 years. RMK-BRJ has written a new outstanding record in the history of major construction. I congratulate them for this superb achievement.

"This program also became the greatest challenge of the Navy's Civil Engineer Corps in its 130 year history. As Commander, Naval Facilities Engineering Command, I represent my predecessors who accepted this challenge and the Navy Civil Engineer Corps Officers who directed the work. A survey of our corps today shows few navy civil engineers who have not been involved in this Vietnam construction. It was these officers and the many other people who participated who made the program a success.

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Prime Minister Tran Thien Khiem presents the Vietnamese Order of Merit Medal to RAdm. Enger during the closeout ceremony.

CLOSEOUT
(continued)

and Air Force personnel performed the remainder.

The greatest number of people employed at any one time was nearly 51,000 during July 1966. The most productive month was March 1967 when $54.3 million worth of work was completed.

There were no local sources for manufactured construction materials or supplies. It was necessary to provide a lead time of six months to a year in planning for all materials. Anything from plumbing fixtures to door knobs had to be shipped, sometimes 12,000 miles across the U.S. and the Pacific Ocean to Vietnam.

Equipment and parts valued at $208 million was distributed by land, sea and air to 75 construction camps and hundreds of smaller building sites. There were 143,500 separate spare parts classifications valued at nearly $90 million and 28,000 individual material stock items valued at over $436 million used in the construction.

Enduring Benefits

A major by-product of the program which it is hoped will contribute to the future development of Vietnam is the marketable skills learned by more than 150,000 Vietnamese men and women through on-the-job experience and formal RMK-BRJ training. Women's roles extended to heavy equipment operation, welding and electrical skills when male Vietnamese became subject to an expanded draft during 1968.

Some permanent basic construction resources developed by RMK-BRJ — such as quarries, concrete prestress plants, dredging, heavy construction equipment and maintenance repair facilities — are already producing under Vietnamese government operation.

The Vietnamese government is operating quarries at Nui Sap, Qui Nhon and Da Nang to assist local area construction. Two major concrete prestress plants are under the control of the Vietnamese Director General of Highways. A special program is underway, with joint U.S. and Vietnam participation, to strengthen the construction industry and show it the most effective use of assets and equipment not being returned to the United States.

Work accomplished by RMK-BRJ in Vietnam was primarily for the U.S. Military Assistance Command, Vietnam (MACV). However, other U.S. Government agencies also used the RMK-BRJ construction capability.

Major facilities in the Saigon area constructed by RMK-BRJ include the MACV headquarters, much of Long Binh Army depot, rehabilitation of the Vietnamese Navy Headquarters, the U.S. Embassy, the American Forces Vietnam Network radio and television station headquarters and a Vietnamese TV station. Newport, a complete deep-draft port facility, was built outside Saigon to relieve the critical shortage of deep draft berths in Saigon. A rail spur connected Newport to Long Binh. Five major bridges around Saigon were completed in June 1972 to facilitate military movements and commercial traffic.

New Systems Solve Problems

By July 1965, MACV Headquarters had expanded and established a Directorate of Construction (MACV-DC) to assign priorities and to manage new construction. At this time also, the OICC RVN became an independent command answerable directly to the Pacific Division of the Naval Facilities Engineering Command in Pearl Harbor, Hawaii.

Architectural and engineering (A&E) requirements for studies, surveys, soil tests, and design were done in-house by OICC or awarded to one of the 14 architectural and engineering firms invited to Vietnam.

As the scope of this billion dollar construction program broadened, the OICC and RMK-BRJ were faced with

This barracks complex for the 8th Radio and Research Field Station at Phu Bai is typical of the support provided U.S. troops by RMK-BRJ.

and solved management problems unparalleled in the history of construction. A single order of lumber could strip normal West Coast inventories in a day. Expensive heavy construction equipment became backlog items. The materials and supplies required to sustain a $40 million monthly work in-place schedule — atop normal stateside building requirements — strained many U.S. producers.

Control of this immense program, with its many simultaneous projects, required development of new management techniques and concepts. A sophisticated Level of Effort (LOE) management system was evolved to achieve control over this mammoth undertaking and to assure the proper balance among funds available, the labor force, materials and workload. The LOE system

Bertram L. Perkins

Bertram L. Perkins, chairman of the board and president of Morrison-Knudsen Company and a prime force in launching the accelerated construction contract performed by the RMK-BRJ joint venture in Vietnam, starting in mid-1965, died in an automobile accident at Boise, Idaho on June 3, 1972. He lived to see the giant Vietnam job through to completion but not to participate in the closeout ceremonies at Saigon on July 3rd.

Mr. Perkins, born October 4, 1922 in Schenectady, N.Y., grew up in Los Angeles, Calif. After service with the U.S. Marine Corps in World War II, he earned a B.S. degree in Industrial Management at UCLA. He joined Morrison-Knudsen in 1947 and worked at many contract locations in increasingly responsible positions, culminating in his selection as president of the firm in January 1969.

On the way, he encountered and overcame the greatest challenge any construction man ever faced — the job of building facilities for the gigantic U.S. armed forces build-up in Vietnam. For 18 months, from January 1966 to June 1967, Bert Perkins — as deputy operating committee chairman in overall charge of the enormous program — was the catalyst that activated the firms in the joint venture, developed an effective relationship with the OICC, Vietnam, and gathered a heterogeneous work force of skilled American construction men and citizens of 35 countries of the free world.

When he left Vietnam in mid-1967, Mr. Perkins was credited with leaving behind a highly-competent work team and a smoothly-operating job. He continued to guide the projects from Boise throughout the remainder of the contract.

Sidelights in Numbers

• During the 10 years, 52 RMK-BRJ employees were killed and 248 wounded as a result of enemy action. Three OICC civilian employees were killed in the performance of their duties.

• The joint venture provided 550 million manhours of work with an accident rate four times below that experienced in the U.S.

• Since 1966, a contractor operated medical staff of 130 employees performed services from sick call to laboratory examinations and administered over 2 million inoculations.

• Visitors to the Saigon main office numbered 805,000 people in 10 years. RMK-BRJ also maintained one of the largest private communications systems in the world, including voice and teletype and job-site radio networks.

• Over 6 million square feet of covered and open storage area contained the materials and supplies used in construction. The RMK-BRJ fleet numbered 200 craft plus a dredge fleet at one time numbering 13 dredges.

• A charter aircraft service of 13 planes flew 421,000 passengers and 61 million pounds of material, supplies and equipment. There were 1,244 yellow trucks between 2 to 35 ton capacity moving an average of 508 thousand tons of cargo per month.

University Village intersection on Vietnam's busiest highway QL-1A, between Saigon and Long Binh was part of the Lines of Communication program to upgrade Vietnamese roads and highways.

has received widespread recognition for its simplicity and effectiveness.

Prefabrication Speeds Work

In the construction area itself, unique methods were developed to speed the work. The byword was prefabrication of component parts, accomplished at relatively secure, centrally-located shops and yards under expert guidance. The parts were then transported by truck or barge to construction sites where heavy equipment was used to put the pieces together.

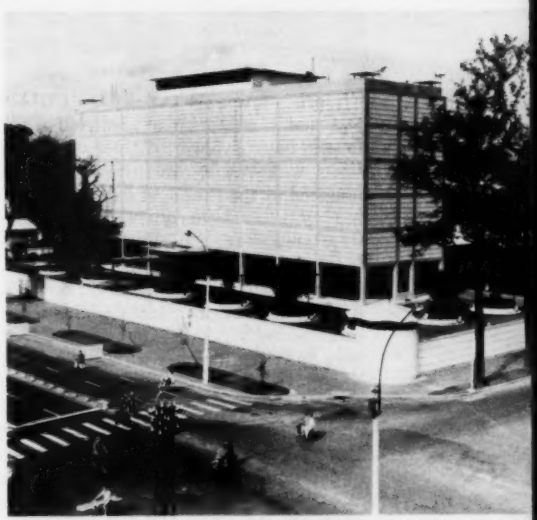
A particularly important development was steel jacketed piers, or as they became known, Reeves piers. H. W. Reeves, assistant resident partner of Brown and Root, championed a design of prefabricated steel piers and truss work, initially for deep water piers at Da Nang. The sections were prefabbed at Poro Point, Philippines, brought by barge to Da Nang and put into place. They were also found suitable for the Da Nang River bridge and for a bridge at Cam Ranh Bay.

Paperwork Chaos

The size of the overall contract, the numbers of personnel, the volume of supplies, equipment and materials and the funding problems handled by the OICC required a computerized control system. Conventional accounting methods buried employees in volumes of paperwork, and did not satisfy the needs of management. A crash program computerized all basic systems; the ordering, stocking, accounting and reorder of supplies and equipment; identification of all projects built, their component parts and materials used, cost and progress; the identification of equipment, its location, use and the scheduling of its maintenance; monitoring the overall financial management of the entire contract; and preparing payrolls and personnel rosters.

This data processing work started in 1965 and became operational in 1966. It opened a new field to Vietnamese employees. Over 80 Vietnamese were employed in the operation, and eventually seven became computer programmers. The system developed to train the personnel was borrowed and used by the United States Agency for International Development and the Vietnamese Ministry of Labor to train their personnel.

The construction accomplished over the past decade in Vietnam by RMK-BRJ has not produced "news" outside the construction industry. But, while the construction was required to support the war, the potential for strengthening the future peacetime economy of Vietnam has been recognized throughout the program. To this degree, this U.S. investment can continue to pay dividends in the future and may serve as one of the important foundations for a strong Republic of Vietnam.



American Embassy in Saigon, completed in 1967 is a six-story, 240 room building.

ACTOVRAD (Radar) site on Monkey Mountain near DaNang was one of several constructed along high points of the coast and mountain peaks on offshore islands.

CBMU 302 STANDS DOWN

By LCDR WILLIAM M. BASS, CEC, USN

The era of construction battalion service in Viet Nam ended on January 24, 1972 after more than seven years. On that date, Construction Battalion Maintenance Unit 302, once the largest Seabee unit to exist since World War II and the last to serve in that war-torn land, hauled down its colors and redeployed to Port Hueneme, California.

The story of how this 600-man unit accomplished its redeployment is of particular interest because it was accomplished in an accelerated timeframe during which it continued its mission of constructing dependent shelters for the families of Vietnamese Navymen and maintaining naval bases in all four military regions.

Moving Date Advanced

Until November 24, 1971, CBMU 302 had planned on a predicted withdrawal date of April 1972. However, the troop withdrawals which had been announced by the President for the December 1971 — January 1972 timeframe were greater than estimated and forced the decision in the case of CBMU 302. Upon learning of this decision, the unit immediately began planning the large task of withdrawing the six hundred man battalion together with the massive accumulation of equipment and materials it had amassed in its four and one-half years of continuous service in Viet Nam. The planners, consisting of the unit's commanding officer, Cdr. D. G. Wilson, the executive officer, LCdr. W. M. Bass, Jr., the supply officer, LCdr. R. C. Hoppe, and the embarkation officer, LTJG G. E. Huddleston, developed formative plans and milestones for the redeployment within hours of the decision.

The commanding officer left the next day to discuss the plans for the move with Rear Admiral Spencer R. Smith, Commander Construction Batallions U.S. Pacific Fleet, at Pearl Harbor, Hawaii and with the Chief of Naval Personnel detailers in Washington, D.C. Later it would become apparent that the success of the move was a direct result of these initial discussions which resulted in a complete understanding of actions to be taken at all levels. Meanwhile, the executive officer and the embarkation officer continued to develop the redeployment plans, including the publication of a redeployment operation order and the naming of certain key personnel to assist in the move.

A prerequisite to the redeployment was the desire of the unit's operational commander, Commander of Naval Forces Viet Nam, Rear Admiral R. S. Salzer, that CBMU 302 continue its construction effort at least until December 31, 1971 and until completed at certain sites such as Chu Lai, Cu Lao Re and Nam Can. If the unit was to be out of Viet Nam not later than January 24, 1972, the planning and execution would have to be perfect and weather interference would have to be minimized.

It was decided that only approximately one hundred and twenty-five of the unit's three hundred and sixty automotive vehicles would be retrograded, and that the remainder could be utilized by other activities in Viet Nam or could not be economically retrograded and should be turned over to the property disposal officer (PDO). Since these vehicles were located at the more than twenty remote detachment sites which were scattered throughout Viet Nam, a plan for equipment mount-out was required.

Equipment and materials located at sites in military region ONE were to be transported to the seaport of Da Nang for load-out aboard Seventh Fleet ships. Construction had already been completed at Thuan An, the northernmost site, and its equipment, materials and personnel were immediately returned to Da Nang. At Chu Lai and Cu Lao Re, the targeted completion date for construction of the dependent housing units was 6 January 1972 and provisions were made to mount-out this material and equipment for Da Nang on or before January 9.

SK2 J. F. Everett, CBMU-302, builds one of the intangibles, good will, with young Vietnamese, as he explains baseball finesse to attentive youngsters.

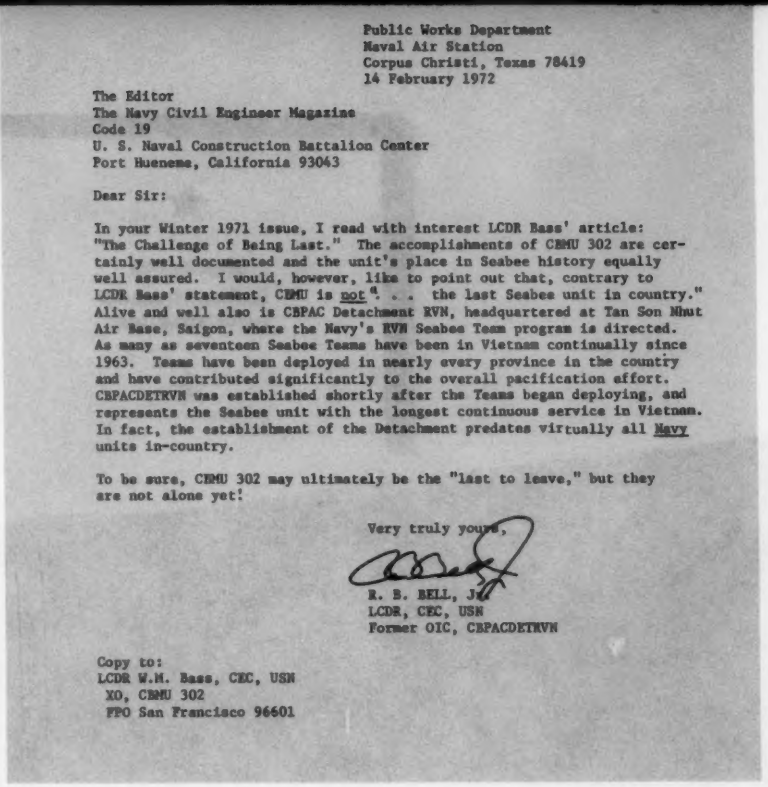
Projects Continue

Sites in military region Two were located at Cam Ranh Bay and at Ninh Chu. The Cam Ranh Bay construction consisted essentially of completing a large dependent housing area there and installing a sewerage system. The targeted completion date was set as January 10. The effort at Ninh Chu consisted of providing supervisory assistance to Vietnamese Navymen who were constructing housing units on a "self help" basis. This effort would continue after CBMU 302's withdrawal with the men, material and equipment there being transferred to the Enlisted Allowance, Naval Support Activity Saigon to complete the project. All equipment and materials to be retrograded from Military Region Two sites was to be mounted-out from Cam Ranh Bay on January 19, 1972.

All material and equipment from sites in Military Regions Three and Four including that from the base camp at Bien Hoa was to be delivered to the port of Vung Tau for load-out aboard Seventh fleet ships on approximately January 20. Personnel working on the dependent housing sites on the tiny island of Poulo Obi and their equipment were to be turned over to the Enlisted Allowance, Naval Support Activity Saigon to complete this project after the departure of CBMU 302. The same was true of the sites at An Thoi and Cho Moi. Construction of fifty units of housing at Nam Can was required prior to the departure of CBMU 302, and December 31, 1971 was chosen as the terminal date. The equipment and material from this site was scheduled to be loaded aboard navy barges and hauled to Vung

Tau on January 2, 1972. All vehicles located at the base camp at Bien Hoa were cleaned at the site and then driven to the load-out facility at Vung Tau. This was a tremendous effort for the seventy men of the battalion's Alfa Company, and they responded in an outstanding manner, completing well ahead of their scheduled date of January 20.

The battalion also had a large material yard at Bien Hoa which contained the various construction and support materials required for its various job sites. This yard was cluttered with an accumulation of material which had been left behind by the many units which had occupied the camp before CBMU 302, and it was a monumental undertaking to identify, evaluate and dispose of these materials in order to have the yard cleared and ready for turnover. Battalion personnel again responded with a tremendous effort and had cleared and turned the yard over to the Army unit that was to occupy the camp on January 1, 1972.



Public Works Department
Naval Air Station
Corpus Christi, Texas 78419
14 February 1972

The Editor
The Navy Civil Engineer Magazine
Code 19
U. S. Naval Construction Battalion Center
Port Hueneme, California 93043

Dear Sir:

In your Winter 1971 issue, I read with interest LCDR Bass' article: "The Challenge of Being Last." The accomplishments of CBMU 302 are certainly well documented and the unit's place in Seabee history equally well assured. I would, however, like to point out that, contrary to LCDR Bass' statement, CBMU is not ". . . the last Seabee unit in country." Alive and well also is CBPAC Detachment RVN, headquartered at Tan Son Nhut Air Base, Saigon, where the Navy's RVN Seabee Team program is directed. As many as seventeen Seabee Teams have been in Vietnam continually since 1963. Teams have been deployed in nearly every province in the country and have contributed significantly to the overall pacification effort. CBPACDETRVN was established shortly after the Teams began deploying, and represents the Seabee unit with the longest continuous service in Vietnam. In fact, the establishment of the Detachment predates virtually all Navy units in-country.

To be sure, CBMU 302 may ultimately be the "last to leave," but they are not alone yet!

Very truly yours,

R. B. BELL, Jr.
LCDR, CEC, USN
Former OIC, CBPACDETRVN

Copy to:
LCDR W.M. Bass, CEC, USN
XO, CBMU 302
FPO San Francisco 96601

Transfer of Personnel

Movement of personnel was also a two-pronged problem. First, the men had to be moved from the construction sites to base camp in order to make arrangements to board their flights out of Viet Nam. Second, after a suitable amount of time to pick-up their personal effects and make other arrangements as required, they had to be booked on aircraft for their return to the United States. At this time, the battalion found itself in the process of reducing in size from a six hundred man unit to a fifty man unit. With five hundred and fifty men due for transfer during the month, orders were requested in November and the Personnel Office set about the monumental task of processing five hundred and fifty men for transfer. These men worked night and day upon receipt of the initial set of orders to ensure that each man received personal and proper processing prior to his detachment.

The majority of the battalion's personnel were transported from Viet Nam to the United States aboard regularly scheduled Military Airlift Command (MAC) aircraft. This greatly reduced the cost of the move by eliminating the many special missions which would otherwise have been needed to move six hundred men as a unit. Further, it gave the battalion opportunity to schedule the personnel out in increments corresponding to the groups being withdrawn from the remote sites, thus eliminating the problem of overcrowding that would have occurred had all six hundred been massed at base camp awaiting flights on the same day. Instead the personnel from a team site such as Nam Can would arrive at base camp, spend four days getting paid, processing their orders, picking-up their personal effects and making other personal arrangements and then report to Ton Son Nhut for their MAC flights. Personnel were scheduled out in groups of thirty to sixty men at four day intervals commencing on January 9, 1972 and ending on January 24, 1972.

Two Echelons

Only two dedicated missions were required to relocate the battalion. The first left Bien Hoa on January 12, 1972 carrying thirty men (twenty of which were to remain on board the battalion's roster as the advanced party) and ten thousand pounds of communications equipment and personal effects. The second left Bien Hoa on January 24, 1972 carrying forty-eight men and ten thousand pounds of material. Both flights landed at Point Mugu, California which is approximately ten miles from the Construction Battalion Center at Port Hueneme where the battalion's personnel were sent for temporary duty and training.

A total of one hundred seventy (170) CBMU 302 personnel were transferred to Enlisted Allowance, Naval Support Activity Saigon to continue the construction effort in support of the Vietnamese Navy. Four hundred thirty (430) were returned to the United States with fifty (50) of these comprising the strength of the residual battalion.

Throughout the sixty day period of this evolution, daily management meetings were held to correlate the progress of the construction teams in the field with those of the embarkation effort underway in base camp. Those areas which presented problems to the withdrawal received immediate command attention and resolution. A close working relationship was established and maintained with the Commander Naval Forces Viet Nam's Retrograde Planning and Transportation Divisions.

Base Camp Turnover

On January 22, 1972, a ceremony was conducted at CBC Bien Hoa commemorating the withdrawal of CBMU 302 from Bien Hoa and the turnover of the base camp to the 215th Command and Support Battalion of the 3rd Brigade's First Air Cavalry. At this ceremony, Commodore Tanh, the Vice Chief of Naval Operations Vietnamese Navy, presented the Civic Action Unit Citation to CBMU 302, the Honor Medal First Class and Civic Action Medal to Commander Wilson, and Technical Service Medals First and Second Class to eighteen of the battalion's officer and enlisted personnel. Commodore Tanh and Rear Admiral Wilson, the Deputy Commander Naval Forces Viet Nam, praised CBMU 302 for its contribution toward the Vietnamization program.

SEABEE ME

WASHINGTO

Scheduled For D
MARCH

CONTRIBUTORS LIST

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SPONSORS:
Seabee Memorial Association, Inc.

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The bas-relief of Seabee exploits (pictured above) will background central statuaries of a Seabee and a foreign child, indicative of the civic compassion of the Navy's builder-fighters.

The monument has been approved for erection on public grounds by a Joint Resolution of both Houses of Congress. Anticipated dedication date is the Seabee Anniversary in March 1973.

Contributions and pledges amounting to $360,000 of the $500,000 goal have been received by the sponsors. Conclusion of the fund establishment campaign is scheduled for December 31, 1972.

MEMORIAL

GTON, D. C.

For Dedication

RCH 1973

ORS LIST PAGES 29-31

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SCULPTOR
Felix de Weldon
Washington, D. C.

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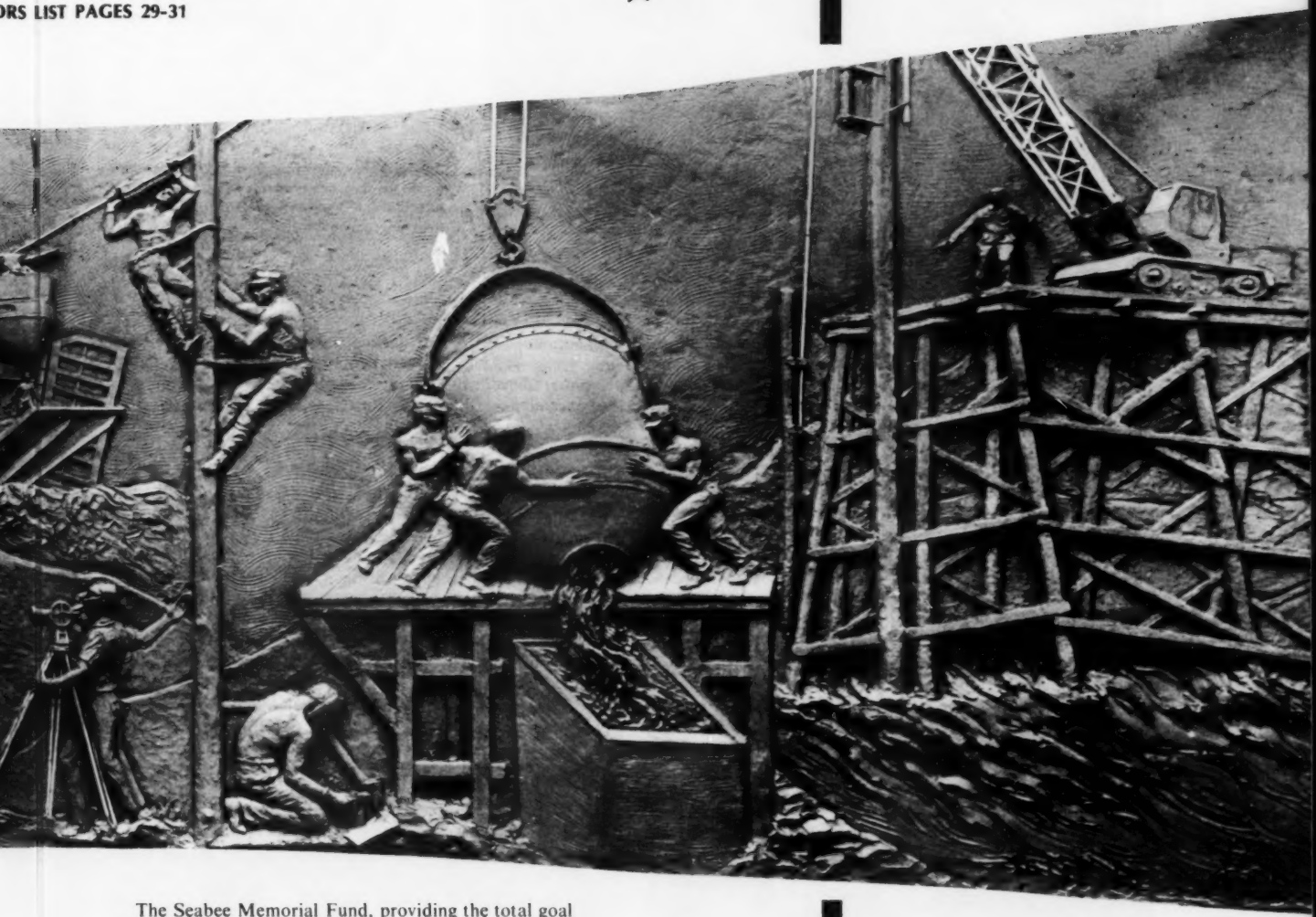

The Seabee Memorial Fund, providing the total goal is reached, will provide from 12 to 15 annual scholarship awards to Seabee dependents. On the basis of present receipts four awards are to be made for 1972.

Final fund raising activities include the sale of annual Seabee Calendars with full-colored panels from the Navy-Marine Combat Art Exhibit. The 1973 Seabee Calendar is now available ($2).

Contributions, calendar purchases, and all correspondence should be directed to the *Seabee Memorial Association Inc., Post Office Box 19383, Washington, D.C., 20036.*

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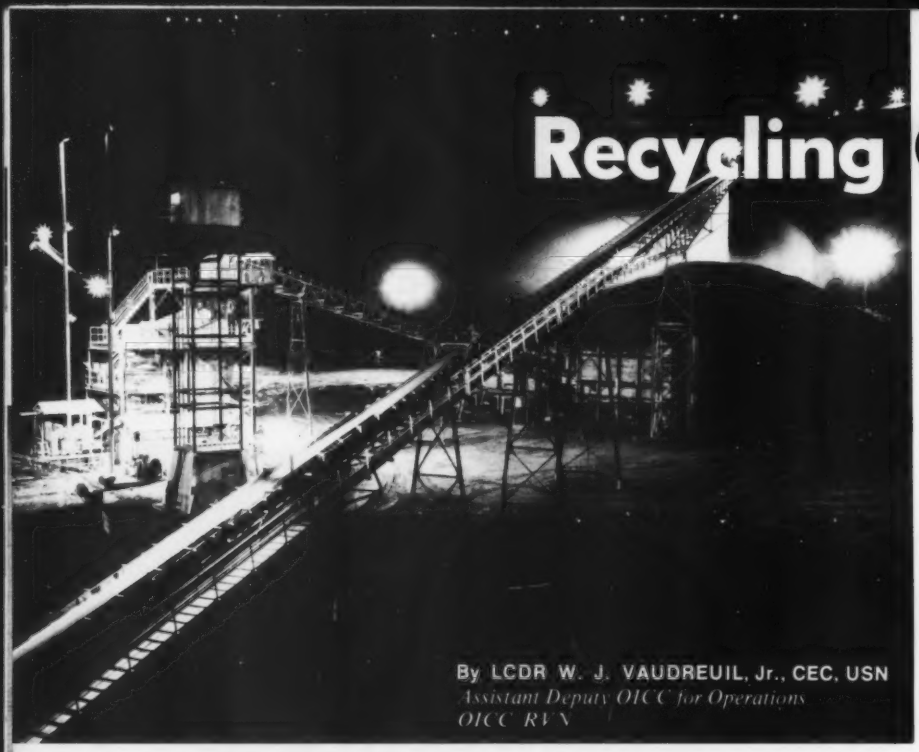
Recycling Construction R



By LCDR W. J. VAUDREUIL, Jr., CEC, USN
Assistant Deputy OICC for Operations
OICC RVN

Crushing operation in quarry near DaNang was one of the first rock products sites to be turned over to Vietnamese for operation by their contracting firms.

Fortunately all wars end, or — as has so often been the case in "wars of national liberation" — they simply wind down and fade away. In centuries past, war's end signaled a period of peace and adjustment for the governments and the peoples involved.

The manner in which the transition between war and peace is made frequently spells the difference between success or failure of the peacetime economy.

In the Republic of Vietnam, the U.S.-sponsored Cost Plus Award Fee (CPAF) joint venture, RMK-BRJ, has dismantled its camps and facilities and discontinued operation. By June 30, 1972, the structures, equipment and resources used to support its war-related construction were dismantled and being returned to the U.S. or distributed throughout the world. Many of these assets, however, will remain with the people of Vietnam to help them nurture and expand their basic construction industry.

The Officer in Charge of Construction, Naval Facilities Engineering Command, Contracts, Republic of Vietnam (OICC RVN), the Department of Defense construction agent in Southeast Asia, became concerned early in 1971 with developing ways of using the surplus assets of the joint venture to benefit the Vietnamese heavy construction industry. Though not actually responsible for other than physical construction, OICC leaders felt they could not remain passive in the face of a potential squandering of resources possible after completion of the wartime contract.

Program Preserves Assets

The OICC, RAdm. A. R. Marschall, set the guidelines. The Deputy OICC for Operations, Capt. R. E. Anderson, and his staff launched a two-pronged attack to prevent loss of three valuable assets critical to the fostering of a viable construction industry: (1) the operating industrial sites, (2) the experienced small-unit management, and (3) the skilled manpower trained by the joint venture. The attack involved, first, the transfer of industrial sites as intact operating entities and, equally important the bolstering of road contractors through equipment support and field advice.

These were considered vital elements in the OICC's Vietnamization program. If the available resources and the desired goals could be meshed to fit into a workable package, a basic enhancement program could be developed to bolster the construction industry. The OICC felt they could.

The Industrial Sites

By early 1971, the new OICC, RAdm. F. M. Lalor, Jr., in close cooperation with the Military Assistance Command, Vietnam, Directorate of Construction (MACDC), was able to project dates when RMK-BRJ would be releasing industrial sites for disposal. It was apparent that the value of these sites, aside from their considerable monetary worth, was their potential contribution to the future overall economic development of the construction industry.

Going beyond its official role, the OICC transferred operating sites to the United States Agency for International Development (USAID), which, in turn, transferred them to appropriate ministries of the Government of Vietnam. These actions were in concert with USAID and MACV, fulfilling a carefully-researched and soundly-based concept of development arrived at through a joint planning group called the Committee for the Development of the Industry of Construction (CDIC).

The CDIC was a follow-on to the MACV sponsored Vietnamese Construction Industry Planning Group (VICPG), formed in October 1970 to study the impact a lessened U.S. presence would have on the Vietnamese economy and to identify assets to be left behind.

After detailed study of the potential benefits to be gained by use of surplus U.S. assets for industrial development, recommendations were then passed to the Vietnamese Prime Minister and other governmental ministers for comment. They immediately and enthusiastically discerned the potential for national development offered through the VICPG proposals, and the Prime Minister joined his ministers in recommending the formation of the CDIC with high-level joint Vietnamese government and U.S. membership.

With the task of development of a specific program to optimize the Vietnamese construction industry's use of the assets when made available, CDIC members went to work. The detailed planning through CDIC was yet to be fully under-

n Resources

Capt. R. F. Jortberg, OICC Vietnam, (right), accepts Meritorious Unit Citation from RAdm. A. W. Price, commander, Naval Forces, Vietnam, during RMK-BRJ closeout ceremony.

way when the first of the identified sites was transferred in August 1971 from RMK-BRJ to USAID for the Ministry of Public Works. At the coastal resort city of Nha Trang, a prestressed components fabrication plant, funded through USAID, and constructed and managed by RMK-BRJ was transferred as an operating plant with the skilled workers and management retained.

By December 1971, the second of the major prestress plants was ready for turnover. The Chau Thoi prestress plant, located just outside Saigon, was originally a small production facility of the Directorate General of Highways (DGOH) under the Ministry of Public Works. Through USAID funding, the plant had been upgraded, rehabilitated and operated by the joint venture. Before turnover, the Vietnamese operating staff was carefully screened and culled to permit continued operation by DGOH.

These two successful site transfers reinforced the initial enthusiasm for construction industry site transfers and served as a catalyst for more requests for site transfers. During December, USAID formally requested the five largest RMK-BRJ industrial sites, and expressed interest in other contractor assets and equipment for construction industry development.

The CDIC became the clearing house for each request, which was thoroughly evaluated as to the net worth and economic effect the transfer would have on the development goal. After all agencies were satisfied with the project, priorities were established for approved transfers. The decisions on sites to be transferred were then set in firm guidance from MACV and USAID when the CDIC recommendations were adopted.

OICC Implements Turnover

With these basic decisions made, the OICC carried out the detailed planning required to implement transfer of each industrial site as a complete and usable facility, including all installed and related equipment.

In February, 1972 the large Nha Trang quarry and crusher operation was transferred to the Ministry of Public Works to provide rock and mineral products for regional road maintenance projects. In April, a crushing plant in Binh Dinh was transferred to USAID for the Vietnamese Railway Service to provide ballast rock and depot maintenance materials.

The large quarry and industrial site operated by RMK-BRJ in DaNang was turned over to USAID in May 1972 for transfer to a semi-autonomous agency of the Vietnamese government. The DaNang facilities were to fulfill the needs of local contractors for construction mineral products in the northern provinces. In the Delta region, two asphalt plants and a concrete block plant were turned over to MPW at Can Tho for use by civilian contractors.

In the Saigon area, RMK-BRJ developed the Saigon University Mineral Products Company (SUMPCO) to supply quarry products to the area and to become an extensive industrial site as well. During June, SUMPCO was turned over to USAID for the Ministry of Public Works to provide rock, asphaltic products, batched concrete for the capital city roads and for village repair throughout Military Region III.

Saigon Island Depot, the heart of the RMK-BRJ nationwide logistic support system was split up for a three-way disposition: the major repair facility and the warehousing sec-

R. D. McLaughlin, (second from right), American advisor to Vietnamese Engineering and Construction Co., reviews site turnover file with (l. to r.) Mr. Minh, VECCO representative; R. W. Wood, RMK-BRJ Saigon Island manager; and Cdr. J. A. Erickson, CEC, USN, Deputy OICC for operations.

All buildings and shop facilities of each industrial site were transferred intact. In some cases, sites were transferred in increments to the government of Vietnam to assure the retention of skilled manpower, and to prevent deterioration of operating equipment.

tions were alloted to future civilian industrial development; the marine repair facility was allocated to the Army of the Republic of Vietnam for small assault craft maintenance and repair.

Standardized Transfer Methods

The transfer of each of these sites was handled by the OICC in generally the same manner. Four months prior to closure, a carefully researched and coordinated site study was conducted to minimize adverse impacts on the ongoing construction, yet to accomplish the disposal mission quickly and efficiently. This site closure procedure required tactful coordination and reconciliation of diverse interests to arrive at the goal desired by all. While the OICC was concerned with efficient disposal of assets in accordance with CINCPAC guidance, USAID was interested in accepting only equipment to operate the site in a potentially profitable manner. Concomitantly, the Government of Vietnam was interested in obtaining the maximum amount of equipment in the best possible condition to reach the high goals they had set for the development program. The success of this tripartite arrangement is evidence that each organization represented respected the individual member requirement and all worked together for the good of the construction industry.

Specialists Monitor Exchanges

The ultimate success of the site turnover program was a result of the time and effort expended by OICC and RMK-BRJ site closeout team members. It was their responsibility to constantly check and monitor disposal of some 60 camp and project centers throughout the nation, as well as the sites earmarked for turnover. The equipment specialists were faced with disposal of over 17,000 pieces of major and minor construction and construction support equipment in accordance with strict disposal guidelines.

Each team's materials specialists were faced with problems of disposing of remaining construction materials, spare parts and equipment made available for normal excessing procedures. Each team conducted its work under varying degrees of pressure caused by enemy action or inclement weather delaying closure dates. However, in spite of all difficulties, each site was closed with full accountability for each piece of equipment transferred.

Road Building Equipment and Know-How

The OICC also provided limited assistance to individual Vietnamese contractors. The construction of roads and bridges by Vietnamese contractors has in the past been seriously limited because of a lack of knowledge of modern construction techniques by Vietnamese middle management. During the time of the large American military presence, the local road building industry did not keep up, due, in part, to the drain of skilled people into the military construction forces of the Republic and to the preponderance of work being assigned to the joint venture or other U.S. construction forces.

With concurrence of USAID, MACV and the Secretary of Defense, the OICC embarked on a limited role to complement the site turnover program by providing selected government equipment to low bidders on MACV projects. Through procedures written into the contract, the Vietnamese contractors were provided with excess equipment generally not available from local resources. Upon successful completion of the contract, the equipment was retained by the contractor for future additional work. Since the limiting constraint on the Vietnamese construction industry's road building capability was the lack of suitable modern construction equipment, these procedures will go a long way to advance their capability.

Through these two methods, the turnover of industrial sites and the assistance to the road contractors, the Vietnamese construction industry today is a lot sounder, far more capable, and better-equipped for the future than at any time in the past. By providing the Vietnamese with a viable base industry, the OICC RVN helped the nation help itself. The monetary impact to the U.S. government cannot be measured. But the true worth of these programs will be demonstrated in the strength and capability of the Vietnamese construction industry in years ahead. The potential pitfalls are many. But these small steps may provide the momentum for the long haul to future prosperity.

Along with facilities and equipment, thousands of trained Vietnamese will be available to help develop Vietnam's construction industry.

Meticulous planning by site closure liaison personnel, well in advance of actual transfer of the site, materially reduced problems at the time of physical transfer.

Dedication of DaNang NSA Public Works' main shops brought RAdm. A. C. Husband, former commander of NAVFAC, to deliver the dedication address.

Public Works Transportation Division, NSA DaNang, maintained over 400 units of material handling equipment such as this front end lift vehicle loading ammunition aboard an LST.

DaNang's Public Works Division operated and maintained more than 1,800 pieces of rolling stock within the transportation division.

NSA DANANG SAIGON

How Seabees Broke Facilities Logjam

By
CDR HENRY J. RINNERT, CEC, USN
and
ENS WILLIAM M. HALL, CEC, USN

In June, 1964, Headquarters Support Activity (HEADSUPPACT) was formed in order to provide support and material to naval activities in Vietnam, particularly those in and around the Saigon area. The function of the public works division was to secure office spaces and warehousing facilities and to maintain them. The group VIII ratings were also involved in construction of two warehouses on land leased by the U.S. Embassy, one of which later became "Warehouse Six," home of the Seabees.

During 1965, the naval commitment increased to the point where HEADSUPPACT could no longer adequately support the operating forces. This increase in commitment led to the establishment of Naval Support Activity (NSA) DaNang and Naval Support Activity (NSA) Saigon.

NSA DANANG

NAVSUPPACT, DaNang, was established on 15 October 1965 to support the Third Marine Amphibious Force (III MAF). The Seabees assigned to NSA DaNang faced a formidable task. The most pressing public works problem besetting the command was real estate. The only space ashore available to NSA DaNang was part of the office spaces in the building known as the "White Elephant" in the main section of the city of DaNang.

Arrangements were made to assume several leased properties, including officer billets and a small transportation compound, from the Naval Advisory Detachment. The public works officer signed the first leases for officer billets and the first repair contracts for the transportation compound and Camp Tien Sha, an old Vietnamese army camp, at the base of Monkey Mountain.

When taken over by NSA DaNang, Camp Tien Sha had neither electricity, running water nor sewage systems. It included 19 masonry-walled, sheet-metal roofed barracks buildings, eight similarly constructed French-style head buildings and six French metal pre-fab buildings; all in a poor state of repair. The first contract provided for repairing, painting and screening, and for the installation of lights and fans in two barracks. Additionally, lights and plumbing were installed and general repairs made to one head building.

Attention was focused upon the requirements of military construction support needed by the new command. At NAVSUPPACT DaNang, for the first time since World War II, there was a requirement for the U.S. Navy to move ashore and establish a major logistic support base at a remote location, without any prior development or planning for such a base.

An initial emergency construction program of $54 million was initiated to provide those facilities most urgently needed to provide shore-side support of the new major command. These facilities included open, covered and refrigerated stor-

Designers in the Public Works Department produced plans and drawings for the numerous projects performed by Seabees or contractors for NSA DaNang.

age, cantonments, POL storage and transfer facilities, port development, roads and utilities. The trucking functions of the Provisional Naval Component Command were turned over to the Public Works Division of NSA DaNang. Advanced Base Functional Components (ABFC) were ordered through COMSERVPAC to CNO to be released, assembled and shipped.

By the use of the ABFC system and prepositioned war reserve stocks, much valuable time in ordering and receiving of materials by CONUS supply depots was saved. With the arrival of the first ABFC 1,000 man galley, the public works department converted one of the existing barracks at Camp Tien Sha into an interim galley/messhall complete with tables, serving lines, stoves, steam kettles, walk-in reefers, ice cream machines, generators and a boiler.

The D-31A (Butler Building Warehouse) functional component, providing 48 buildings, arrived next. Construction was started by the Seabees of the public works department after long and involved negotiations with the mayor of DaNang and the local village chief. As a result of these negotiations, some 4,000 graves were relocated to a new graveyard which had been prepared by NSA DaNang.

Water for Camp Tien Sha was initially provided from a wooden caisson sunk at the foot of Monkey Mountain. At the time of the opening of the interim galley, the public works department's effort to renovate an old French water system and its distribution lines to Camp Tien Sha were successful. Cleaning the tanks, providing new fill lines and repairing the leaks temporarily activated a system reportedly not used in over two years. By use of a wooden tower with a 3,000 gallon canvas tank and a system for filtration and chlorination, part of the water supply was made potable. NSA DaNang had the capability to mess and berth 1,000 men in Camp Tien Sha.

In DaNang, billets for approximately 200 officers and enlisted men were leased and furnished. Facilities such as the "White Elephant" offices, motor pool, commercial piers, T-Pier, "Muesem" ramps and the public works maintenance compound were also leased. However, the only real estate available for construction was Camp Tien Sha, the warehouse site behind the ARVN ammunitions depot, and the hospital site in DaNang East.

Public Works Department of NSA DaNang had about 300 Seabees initially, and reached a maximum of 650 in 1968. In 1968 NSA DaNang was considered the largest naval facility in the world.

NSA DaNang continued to support the navy and marine corps in the I Corp area until it was disestablished in July 1970, at which time the equipment and maintenance responsibilities were assumed by NSA Saigon.

NSA SAIGON

NSA Saigon was established in the Headquarters Support Activity Saigon Cofat compound on 17 May 1966, simultaneously with the disestablishment of HEADSUPPACT whose functions were assumed by the U.S. Army, Vietnam 1st Logistics Command. Offices were moved to Tran Hung Dao a few months later. Public Works Department had its offices at Tran Hung Dao in 1966, and in 1968 the Seabees moved to "Warehouse Six" where they operated until the activity was closed down in 1972.

The mission of NSA Saigon was to provide, maintain and operate facilities and to provide services and material support to NAVFORV fleet units of the operating forces of the navy and such others as may be designated in the II, III and IV Corps tactical zones. The command initially consisted of the headquarters located in Saigon, and operational detachments located at Cam Ranh Bay, Can Tho, Cat Lo, Nha Be and Qui Nhon.

The concept of operations originally planned for the public works department was for individual bases to accomplish their own minor repairs, utilizing base personnel rather than public works personnel. Accomplishment of work over and above base capabilities was to be requested from the army under inter-service support agreements or requested from the public works department. To accomplish this the public works department was to have two or more mobile maintenance teams. Maintenance of facilities in Saigon and provision of engineering services would be provided by the army.

In addition, the public works department was also charged with the construction of temporary bases at My Tho, Vinh Long, Long Xuyen and Sa Dec.

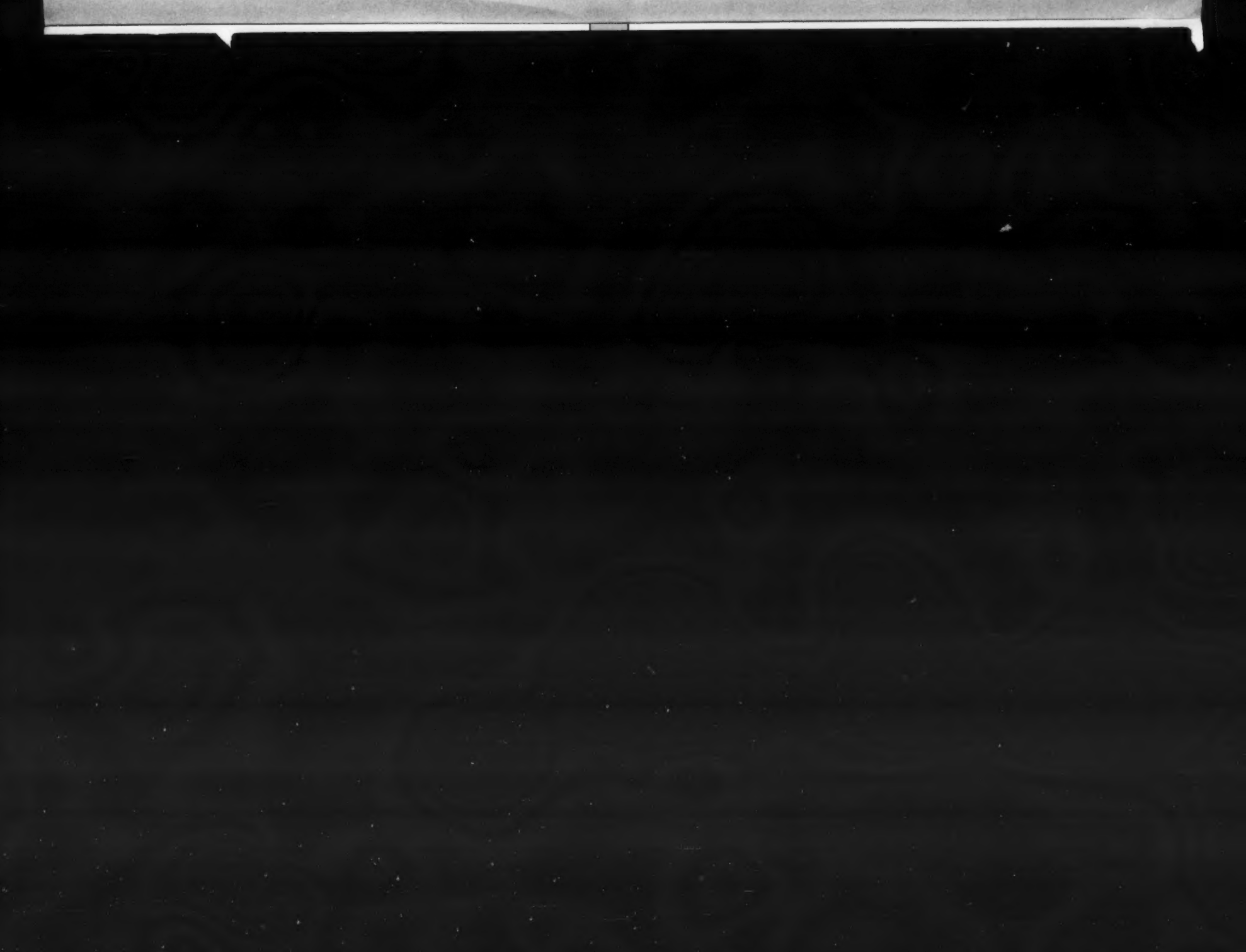
However, it soon became apparent that the requirements levied on the public works department necessitated the development of an engineering capability and the establishment of administrative and transportation divisions. As a result, the public works department was reorganized to include the following divisions: (1) administrative, (2) planning and design, (3) maintenance, (4) contracts and real estate, and (5) transportation.

Seabees from the public works department were engaged in the construction of interim bases for the "Game Warden" project. By using ABFC units, beneficial occupancy dates were moved ahead rapidly. The Seabees from NSA Saigon ranged all over the II, III and IV Corps areas, working on projects such as the installation of radar units on Poulo Obi's Con Son islands and drilling wells at Nha Be.

Interim support bases were constructed at Sa Dec, An Thoi, Vinh Long, Ha Tien, My Tho and Tan Chau. Mobile maintenance teams were sent in after many contractors left their jobs in order to finish up the job or to improve habitability of existing structures. The public works department also provided generator support to the various bases and facilities requiring them. Seabees from NSA also assisted the force engineer in reconnaissance of new base sites, including preliminary surveys and soils investigation.

Seabees attached to the NSA detachments were involved in providing the labor force for projects founded by AIK (Assistance in Kind) monies. As the Naval Mobile Construction Battalions, the Naval Maintenance Units, and the Seabee Teams departed Vietnam, the Seabees of "Warehouse Six" were called upon to complete unfinished projects and equipment and material disposition.

Public Works Department of NSA Saigon had an average full time complement of about 150 to 200 Seabees assigned. A peak of about 320 was reached in January 1972. Stand down started in February 1972 and by 30 April only 50 Seabees remained until complete close down on 30 June 1972.



NAVY'S NEW OIL SKIMMER DEMONSTRATED

• **Boston, Mass.**

The capabilities of the navy's newest oil skimmer workboat, the JBF-DIP 3001, were demonstrated for Deputy Under Secretary of the Navy Joseph A. Grimes, Jr., and other navy and civilian dignitaries at the Naval Shipyard here July 20, 1972.

"The Navy is playing a leadership role in the protection of our environment," Mr. Grimes said. "Our pollution abatement budget has been doubling each year for the past several years."

"If Congress approves the budget that is before it," he added, "the Navy will spend close to $1 million on oil cleanup equipment between now and the end of June 1973."

Current standards mandate zero oil pollution of inland waters. NAVFAC is responsible for developing the capability for containing and collecting harbor oil spills, including equipment development and evaluation.

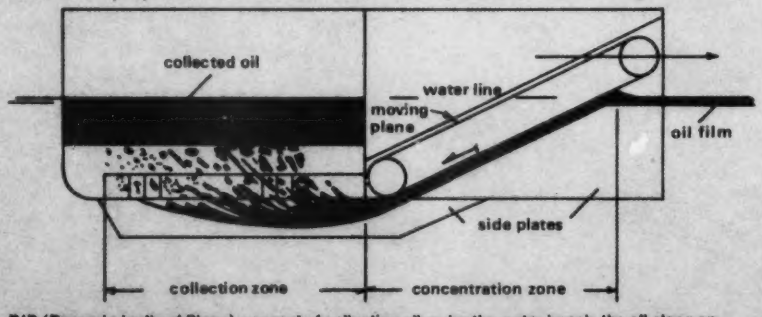
The new craft, developed and built by JBF Scientific Corp., Burlington, Mass. under contract to NAVFAC, successfully collected about 30 gallons of biodegradable castor oil spread on the waters of Boston Harbor for demonstration purposes. It is intended for use at the Puget Sound Naval Shipyard, Bremerton, Wash.

Intended for use in harbors and near-shore areas, the 25-foot self-contained unit utilizes the dynamic inclined plane (DIP) design to collect oil and water which has been confined below the skimmer by vertical plates enclosing the sides of the moving craft. The oil travels along the surface of a moving endless belt to a collection well, from which it is pumped into holding tanks aboard the boat.

Two articulating sweeps on the bow are capable of cutting a 13-foot swath through an oil slick. At a speed of two knots in a one millimeter slick, the skimmer workboat can harvest as much as 2,200 gallons of oil per hour.

With a two-man crew, the boat has a transit speed of six knots and operates at a speed up to three knots while collecting the oil. It is effective in waves up to two feet high and can also collect oil while stationary. The skimmer is also capable of picking up polyurethane foam chips, perlite or corncob chips which are used to absorb oil on the surface of the water.

A 65 HP air-cooled diesel engine provides power for propulsion, pumping and operation of the moving belt.



DIP (Dynamic Inclined Plane) concept of collecting oil under the water impels the oil along an inclined plane into a collecting well.

NAVY CIVIL ENGINEER NEWS

ASNE GOLD MEDAL TO CDR. EAGER

The American Society of Naval Engineers has presented the Gold Medal Award for 1971 to Cdr. Walter J. Eager, CEC, USN, for his most significant contributions to naval engineering.

Cdr. Eager, director of the Ocean Engineering Program Office at NAVFAC, was cited for demonstrating outstanding professional leadership and technical competence in directing three major ocean engineering and construction projects.

He was responsible for the installation, mission support and recovery of TEKTITE I Habitat in 1969; the installation and recovery of a large antenna array at the Atlantic Undersea Test and Evaluation Center; and for the installation and stabilization of the near-shore ocean cables in the Azores Fixed Acoustic Range in 1970.

In each of these projects, he demonstrated a unique ability to assess requirements and to adapt and use NAVFAC pontoon equipment as innovative, well-engineered ocean platforms in a manner previously unequaled, and with an unblemished safety record.

Through his personal efforts, Commander Eager demonstrated the ability to perform ocean construction successfully and at reasonable costs by adapting terrestrial construction techniques and equipment to ocean engineering requirements.

Commander Eager graduated from the California Institute of Technology in 1953 and received a Master of Science degree in Physics from the Naval Postgraduate School in May 1964.

In his current assignment, he directs development of NAVFAC and Seabee capability to perform missions associated with engineering and construction of complex fixed ocean facilities in support of major anti-submarine and strategic deterrent defense systems.

Cdr. R. D. Keegan (right) relieves Capt. Donald Wittschiebe as commander of the 30th Naval Construction Regiment.

30 NCR Command Change

• Camp Shields, Okinawa

During a change-of-command ceremony on May 8, 1972, at Camp Shields, Cdr. Robert D. Keegan, CEC, USN, relieved Capt. Donald W. Wittschiebe, CEC, USN, as commander of the 30th Naval Construction Regiment. Capt. Wittschiebe commanded the regiment since May 1971, after having served as public works officer and staff civil engineer for the Pacific Missile Range, Point Mugu, Calif. He was scheduled to report to the Naval Base, Newport, Rhode Island, for duty as the commanding officer, Public Works Center.

In assuming command of the 30th NCR, Cdr. Keegan became its twenty-fourth commander. A native of Dedham, Mass. his most recent assignment was as executive assistant to the Commander, Naval Electronics System Command, Washington, D.C.

Guest speaker for the occasion was Capt. Delmar A. Bartley, CEC, USN, chief of staff, Commander Naval Construction Battalions, U.S. Pacific Fleet. A highlight of the festivities was the presentation of the Meritorious Unit Commendation to the 30th NCR for service in the Republic of the Philippines.

NMCB 10 Detail Atlas To NTC Kenitra, Morocco

• Rota, Spain

Recently, 28 men and one officer of Naval Mobile Construction Battalion 10's Detail Atlas redeployed from Rota to the Naval Training Center at Kenitra, Morocco. While at Rota, Detail Atlas worked on an operations building addition. At Kenitra, they will work on rehabilitating an enlisted mens club, constructing three single-story bedroom additions and a pizza parlor.

NMCB-4 PRESENTED PELTIER AWARD

• Port Heuneme, Calif.

Naval Mobile Construction Battalion 4 was presented the Peltier Award at a ceremony May 17 as the outstanding construction battalion for 1971. RAdm. S. R. Smith, commander, U.S. Naval Construction Battalions Pacific Fleet, presented the plaque to NMCB 4's commanding officer, Cdr. J. A. Ruscyk, in recognition of the battalion's performance on their Okinawa deployment. During this deployment as Pacific Alert Battalion, NMCB 4 accomplished essential construction projects throughout the Pacific. The Peltier Award recognized the sustained, superior professional and military proficiency of NMCB 4 men and officers despite difficult climatic and environmental conditions.

The distinguished guests at the award ceremony at Port Hueneme included Capt. E. R. Stacy, commander, 31st Naval Construction Regiment, Port Hueneme, Calif. and Commander Roy D. Gaulden. Cdr. Gaulden, chief staff officer, 31st Naval Construction Regiment, was NMCB 4's commanding officer until December 16, 1970.

Dr. Yachnis Named Chief NAVFAC Engineer

• Washington, D.C.

Dr. Michael Yachnis has been promoted to chief engineer in the Naval Facilities Engineering Command where he has been employed as a consultant on deep water structures. As chief engineer, Dr. Yachnis provides the highest level of interdisciplinary engineering consultation, guidance and expertise in the command.

Dr. Yachnis received his undergraduate education in Athens, Greece, and earned his degrees of Master of Science in Engineering, Master in Engineering Administration and Doctor of Science from George Washington University, Washington, D.C.

He joined NAVFAC at its Chesapeake Division in 1956 and moved to NAVFAC Headquarters in 1963 as head of the structural engineering section.

The author of a number of scientific and technical papers, Dr. Yachnis is a registered professional engineer in Maryland and the District of Columbia. He is a Fellow of the American Society of Civil Engineers, a member of the American Society of Civil Engineers' Council on Ocean Engineering; the Marine Technology Society; the Washington Society of Engineers; the Society of Sigma Xi and is an Honorary Member of Xi Chapter of Sigma Tau Fraternity.

He is the recipient of numerous awards including the Meritorious Civilian Service Award and the Superior Civilian Service Award.

His most recent accomplishment involved the application within the command of the new engineering discipline of Material Certification for Hyperbaric and Deep Ocean Simulation Facilities. Material certification comprises the effective control of design, fabrication, testing, construction, inspection, maintenance and operation of such facilities. The overall discipline insures material adequacy of a facility to perform safely over the operational spectrum.

CAPT. CLEMENTS TAKES COMCBLANT COMMAND

• Davisville, R.I.

Capt. Neal W. Clements assumed duties as Commander, Naval Construction Battalions, U.S. Atlantic Fleet (COMCBLANT), at change of command ceremonies held on August 14 at the Construction Battalion Center.

As the 14th COMCBLANT at the Rhode Island Seabee Base, Capt. Clements relieves Capt. William R. Rogers who served in the position since September 29, 1970.

Civilians from neighboring communities viewed the colorful exercises held in Max Kiel Memorial Gymnasium because of rain.

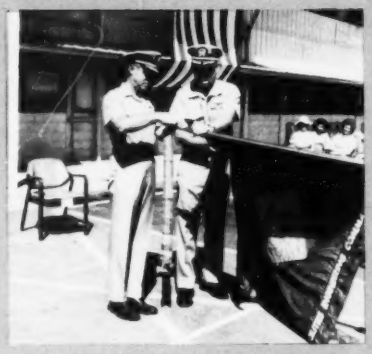
Military and civilian dignitaries who were guests of the Navy included Assistant Secretary of the Navy Charles Ill (Installations and Logistics, Washington); RAdm. Joseph B. Tibbets, commander, Fleet Air Quonset; RAdm. Thomas Weschler, commander, Cruiser Destroyer Force, Atlantic Fleet, Newport; RAdm. Alexander C. Husband, (CEC, USN Ret), former chief of civil engineers and commander, Naval Facilities Engineering Command, Washington; and BGen. M. T. Jannell, USMC, Assistant Quartermaster Genera, Washington.

RAdm. Roy G. Anderson, Commander, Service Force, U.S. Atlantic Fleet, Norfolk, Va. presented Capt. Rogers with a Gold Star in lieu of a third award of the Legion of Merit for exceptionally meritorious leadership as commander of the Atlantic Fleet Seabees from September 29, 1970 to August 14, 1972.

Asst. Navy Sec. Ill extended congratulations on behalf of the Secretary of the Navy for a job well done by the Atlantic Seabees. He noted the outstanding accomplishments of Capt. Clements while serving in the office of the Assistant Secretary of the Navy (Installations and Logistics) and presented him with the Legion of Merit for distinguished and dedicated service in Washington from September 1969 to July 1972.

Capt. Rogers has been assigned to duty as Inspector General, Naval Facilities Engineering Command, Washington.

Established at the Davisville Seabee Center Oct. 1, 1951, the Naval Construction Battalions, U.S. Atlantic Fleet, has the responsibility of planning, coordinating and implementing Seabee construction activities literally throughout the world.



• Subic, Philippines

RAdm. Spencer R. Smith, commander, Pacific Division, Naval Facilities Engineering Command, presents the Meritorious Unit Commendation Award to Public Works Center Subic, while Capt. Walter R. Wagner, CO PWC, assisted during the ceremony held at the PWC Administration Building compound on 29 April 1972. In behalf of the Secretary of the Navy, RAdm. Smith presented the award "for meritorious service during the period 1 June 1965 through 30 June 1971 in providing vital logistic and public works support to shore-based activities in the Philippine area and operating forces in Southeast Asia.

ASME Awards Moreell Medal to RAdm. Reider

RAdm. George Reider, CEC, USNR, was awarded the Moreell Medal of The Society of American Military Engineers for 1971 for his outstanding contribution to the advancement of military engineering while serving as the commander, First Reserve Naval Construction Brigade. He was cited for having raised the reserve naval construction force to a position of increased readiness by his competent management and inspirational guidance. Through new and innovative approaches, he substantially improved the manning and training of, and the equipment availability for, reserve Seabees.

The Moreell Medal, named for Adm. Ben Moreell, CEC, USN (Ret.) is awarded annually to a member of the Civil Engineer Corps, regular, reserve, or civilian, on active or inactive duty, or retired, for outstanding contribution to military engineering.

Capt. Saunders Takes Command at NCEL

• Port Hueneme, Calif.

Capt. Edward M. Saunders, CEC, USN, has assumed command of the Naval Civil Engineering Laboratory, succeeding Cdr. Noel A. Grady, Jr., CEC, USN.

The new skipper reported from Madrid,, Spain, where he was Officer in Charge of Construction, Naval Facilities Engineering Command (NAVFAC) Contracts, directing Navy Construction programs in Europe and North Africa. Before that he was Force Civil Engineer for the Commander, Naval Forces Vietnam.

Capt. Saunders previously had a two-month tour of duty at NCEL in 1952. Later he served in executive positions at both the Civil Engineer Corps Officers School and Naval Schools — Construction at the Construction Battalion Center, Port Hueneme.

Cdr. Grady reassumed his duties as NCEL's Executive Officer after serving as commanding officer following the retirement of Capt. W. A. Walls, CEC, USN, Jan. 1, 1972.

Capt. Saunders entered the U.S. Naval Academy in 1945 and was graduated with a BS degree. After serving on the *USS Washington* and *USS North Carolina*, he attended Rensselaer Polytechnic Institute for two years; earning BCE and MCE degrees. During a diversified career which saw him serve at sea as well as ashore, Capt. Saunders spent a year at the Navy Postgraduate School,

Annapolis, Md. where he majored in physics. He then attended Stanford University, obtaining Masters and Doctorate degrees in physics.

From August 1967 through February 1969, Capt. Saunders served as Assistant Commander for Research and Development (NAVFAC).

A registered professional engineer in Vermont, he is a member of the Society of American Military Engineers, the American Physical Society, Sigma Xi, and Tau Beta Pi. Among many medals and awards, Capt. Saunders has received the Legion of Merit with Combat V, the Navy Unit Commendation, and the Vietnam Honor Medal First Class.

New Housing Underway At Amphibious Base

• Little Creek, Va.

Ground was broken at the Naval Amphibious Base, Little Creek, to begin construction on 590 units of navy family housing under a $13 million contract awarded to Hunt Building Corporation of El Paso, Texas, on June 7, 1972.

RAdm. A. W. Walton, Jr., commander Atlantic Division, NAVFAC, served as principal speaker at the ceremony, at which Capt. R. A. Bihr, Commanding Officer, Naval Amphibious Base, Little Creek, and Mr. Jack L. Hunt, President of Hunt Building Corporation, joined Admiral Walton in turning the first spade of dirt.

The new housing project, a turn key operation, is one in which the contractor is responsible for both the design and construction of the complete project. Unit design calls for both duplex and quadraplex, two-story townhouse style dwellings for enlisted personnel with a total of 425 three-bedroom and 165 four-bedroom units. There will be a variety of building fronts in the project. Units will be brick veneer with wood panel siding, and all will be air conditioned. The completion date has been set for October 1974.

San Diego PWC Alters Barge to Piledriver

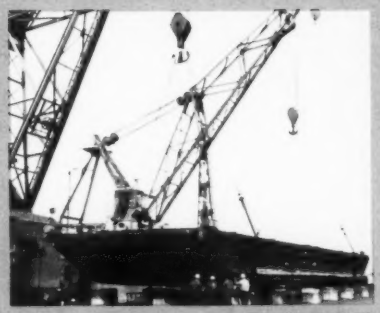
• San Diego, Calif.

Two Navy floating cranes teamed up to lift a 500-ton barge out of the water on Naval Station Mole Pier. The cranes are San Diego Navy Public Works Center (PWC) Transportation Dept., equipment. According to Charles I. Bellmer, it's the heaviest weight handled in a single lift by PWC transportation men to date. Bellmer is the Director, Equipment Operations Div., with the Center Transportation Dept.

The Navy YC barge was picked up out of the water by one 100-ton and one 60-ton floating cranes and set on blocks for sandblasting and painting. The barge is being converted into a pile driver for use by the PWC Maintenance Dept. Conversion work on the barge will include installing hull openings in the barge for sea water suction and discharge. In the past this kind of operation was a costly dry-docking or marine railway procedure accomplished by a civilian contractor. After conversion, the new piledriver is scheduled to replace the present steam-operated one which was placed in service in 1963 when the San Diego Navy Public Works Center was established as a San Diego Navy command. It is costly to maintain and requires the services of a fulltime boiler tender to maintain steam for pile-driving.

The new craft will be diesel-operated and is expected to effect significant savings in operating cost. Additionally the new pile driver will be more maneuverable compared to the one being replaced.

Head of PWC Maintenance, Walt McCollum called pile driving "very specialized work requiring custom built equipment. PWC San Diego has the largest Navy pile driving capability and need on the west coast." He said the prime reason for the Center owning this equipment is because of the continuous need for repair and upkeep in San Diego Harbor.



• San Diego, Calif.

San Diego Navy Public Works Center men assisted by two PWC floating cranes lift this 500-ton Navy barge out of the water on Naval Station Mole Pier. The barge is being converted to a pile driver.

CNO Greets Scholar

• Washington, D.C.

CNO Scholar, LCdr. David E. Bottorff, CEC, USN (right) accepts congratulations of Adm. Elmo R. Zumwalt, Jr., chief of naval operations, following his selection as one of a group of 10 naval officers chosen to attend a university or college of his own choice for advanced study under the recently-inaugurated Chief of Naval Operations Scholar Program. LCdr. Bottorff departed his billet as operations officer with the Public Works Center, San Diego, on July 28 to ready himself for his studies toward a master's degree in business at Stanford University, Palo Alto, Calif.

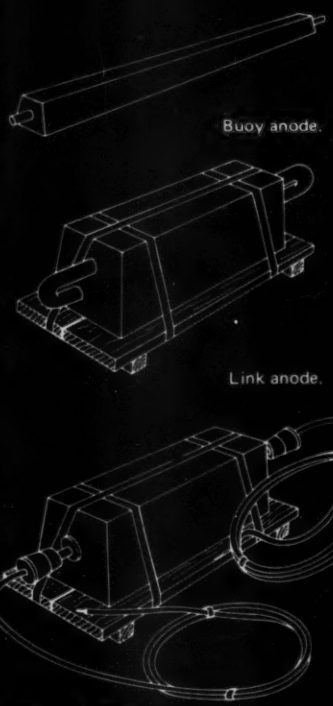
More recently, LCdr. Bottorff was selected to be included in "Outstanding Young Men of America", according to the Outstanding Young Men of America Board of Advisers, Chicago, Ill. This publication recognizes approximately 8,000 men between 21 and 35 who "have distinguished themselves in one or more fields of endeavor," according to a board spokesman.

CBU-402 Seabees Honored by ARC

• Pensacola, Fla.

Five members of CBU-402 receive thanks from the local chapter of the American Red Cross for their work in converting a bread-truck into a canteen/emergency truck. Receiving certificates of appreciation from Vince Currie, chapter chairman of the American Red Cross (far left), are (l to r) BU2 G. L. Vail, CE2 H. S. Greenman, Lt. J. K. Johnson, commanding officer of CBU-402, UT3 R. L. Steele and D. R. Jones.

CATHODIC PROTECTION OF MOORINGS



Buoy anode.

Link anode.

Special-D anode.

Types of anodes used on a Fleet mooring.

By Dr. RICHARD W. DRISKO

Materials Science Division
Naval Civil Engineering Laboratory

• Port Hueneme, Calif.

Naval Facilities Engineering Command field activities have encountered considerable difficulty and expense in protecting steel buoys and ground tackle (chain) in fleet moorings from corrosion.

Consequently the Naval Civil Engineering Laboratory (NCEL), was directed to investigate the feasibility of developing a cathodic protection system that would deter corrosion thus extending the service life of moorings and significantly reduce maintenance costs.

Cathodic protection is achieved by immersing metals in an electrolyte (e.g. seawater) and impressing a negative charge upon them to guard against corrosion. On fleet moorings the required direct current is supplied the easiest by zinc anodes which are gradually consumed as the steel in the mooring is preferentially protected. When present in sufficient quantity, zinc anodes maintain voltage on the cathode (in this case the mooring) at an electrical potential level well above the minimum required for mitigating corrosion (about −850 millivolts with respect to a copper/copper sulfate reference half-cell) but less than what might cause coating damage.

Cathodic protection is a supplement to protective coatings. It is not a replacement.

The NCEL system consists of sacrificial zinc anodes, wire ropes for imparting electrical continuity along the ground tackle, and fittings to secure the components in place.

A four-legged Class B mooring tested by the laboratory in San Diego Bay has been receiving cathodic protection from corrosion since 1966 and should continue to receive similar protection for at least nine years more before replacement of consumed anodes is necessary.

Effectiveness of the system is demonstrated by (1) the absence of significant rusting, (2) no reduction in chain diameter, and (3) periodic monitoring of the electrical potential on immersed portions of the mooring by divers and instrumentation. Also, the protective coal-tar coating on the chain has been resistant to the usual undercutting by rusting. In turn, this condition has reduced current requirements for cathodic protection.

The Three Anodes

Three types of commercially-available sacrificial anodes with a zinc composition conforming to MIL-A-18001 are used. To perform properly, the anodes, when installed, must be free of paint, grease, dirt, and other surface coatings.

For direct use on buoys, *a simple zinc casting* on a steel pipe is a convenient anode. The casting is 36 inches long by 12 square inches in cross-sectional area and weighs approximately 150 pounds. The pipe core is ¾ inch in diameter and 48 inches long. Buoy anodes must be secured where they can avoid impact with moored vessels; for example, at the bottom of telephone buoys or in sea chests cut into the cone portion of pegtop riser-type buoys. Zinc castings should be located about 4 inches from the surface of the buoy.

Link anodes are cast on special chain links that can be joined directly into the ground tackle system before the mooring is laid. The zinc castings are 24 inches long with 80 square inch cross-section. They weigh approximately 500 pounds. Link anodes are secured to a wooden pallet for easy handling by a fork-lift truck.

Special-D anodes have zinc castings 24 inches long, 80 square inch cross-sectional area and weigh 500 pounds; the same dimensions as those on link anodes. And as buoy anodes, Special-D anodes are cast on ¾-inch-diameter steel pipe. An insulated copper wire is passed through the pipe core, bared at both ends, soldered, and later potted to the pipe ends. These lead wires extend about 30 feet from the anode which is secured to a wooden pallet for easy handling by a fork-lift truck.

(Turn page, please)

CATHODIC PROTECTION

(cont'd from the preceding page)

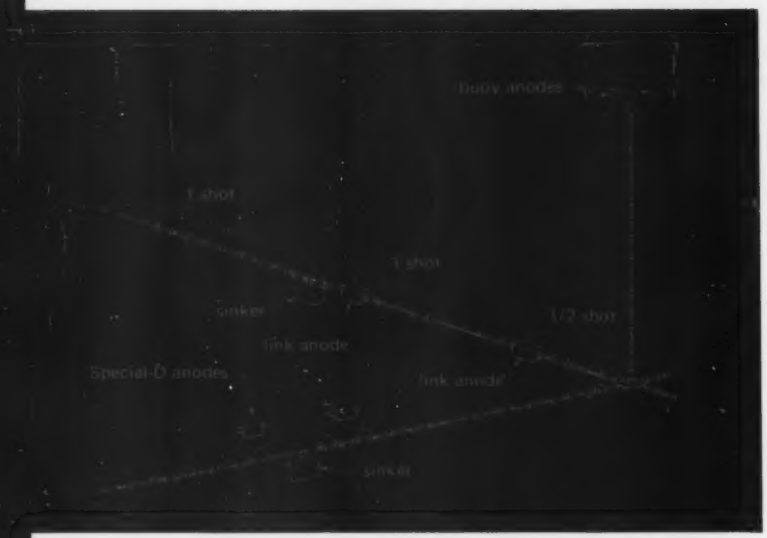
Special-D anodes are designed to be joined *in situ* to wire ropes to supplement expended link anodes.

Galvanized steel wire ropes, usually ⅝ to ¾ inch in diameter, are woven through the ground tackle and periodically joined to it, providing electrical continuity necessary for distributing the cathodic protection.

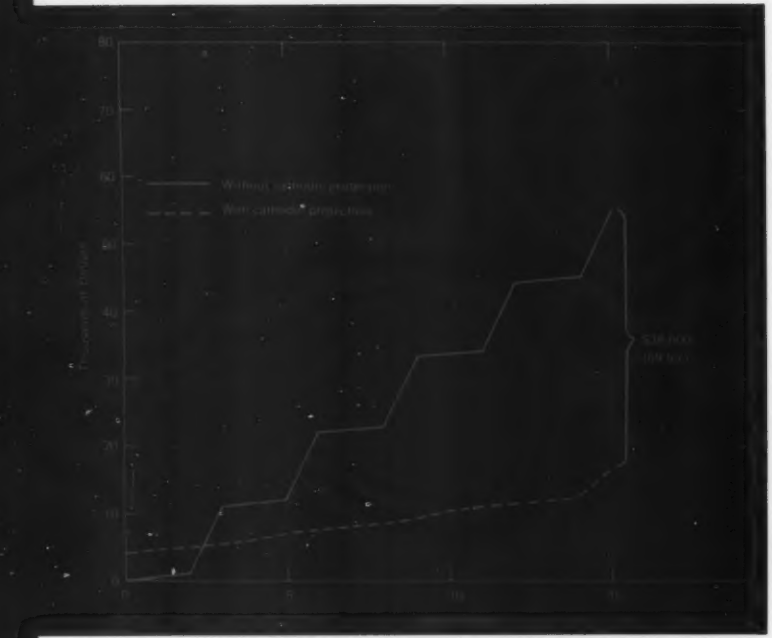
Types and sizes of fittings for the cathodic protection system vary with the specific function to be served. Steel brackets welded directly to the buoy shell support the buoy anodes. Standard joining links (see Table 6-13 of NAVFAC Design Manual 26, "Harbor and Coastal Facilities") connect the link anodes to the ground tackle. Different types of clamps are available to secure the Special-D anodes to the wire ropes. Metal pipe clamps join the wire ropes to the ground tackle.

Link anodes and wire ropes can best be joined to ground tackle on the deck of a floating crane after the chain is arranged for laying. With the buoy and link anodes securely in place, wire ropes are loosely woven through every eighth chain link (approximately) and then clamped. For a tight-riser chain of ½ shot or less, no wire rope nor anode is necessary. A single anode can protect 1½ shots of coated chain. Anodes are usually evenly spaced on each leg of a riser-type mooring with one near the ground ring where corrosion is the greatest. A portion of a cathodically protected mooring is depicted in Figure 2.

The chart graphically shows accumulated maintenance savings on an eight-legged Class BB mooring in San Diego Bay during a 15-year period. The savings was 69.5 percent. A similar analysis of a three-legged Class D mooring in San Diego Bay during a 15-year period revealed a savings of 68.8 percent. Considering the present value viewpoint and using a 10 percent discount rate as specified in SECNAVINST 7000.14 of 30 January, 1970, the savings during a 15-year period would be closer to 50 percent. If this rate of savings could be achieved throughout the Naval Shore Establishment, approximately $360,000 might be saved annually from the average amount of $717,000 allocated by NAVFAC for mooring maintenance for FY70 and FY71.



Portion of Fleet mooring showing location of anodes.



Cumulative cost savings for maintaining an eight-legged Class BB mooring in San Diego Bay for 15 years.

For more information on the cathodic protection system design, installation and cost analysis, the reader is referred to NCEL Technical Report R-760. "Cathodic Protection Kit for Fleet Moorings," By R. W. Drisko, Port Hueneme, California, March 1972.

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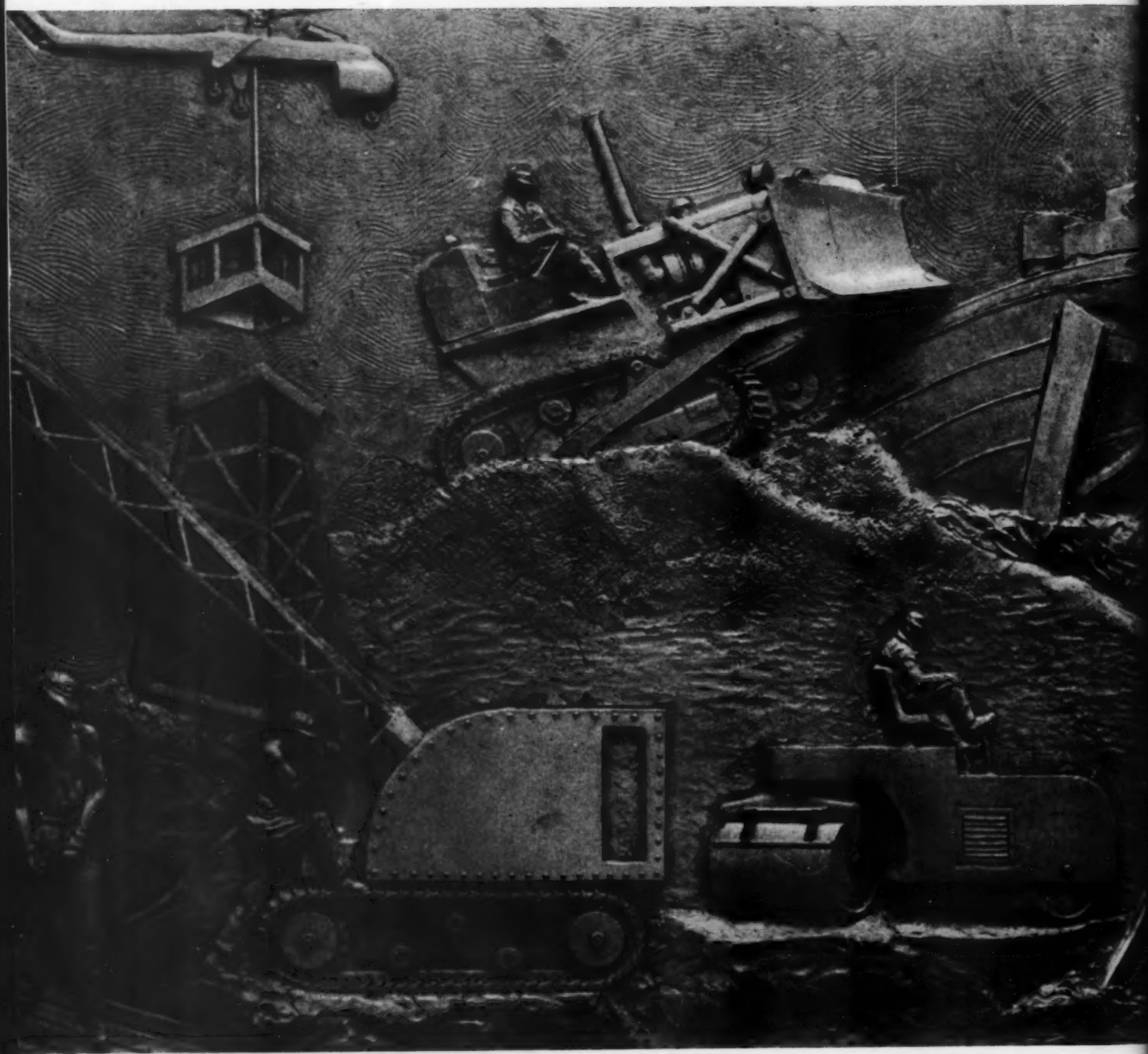

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